

**SECTION 01 10 00.W912HN-07-X-9316  
TASK ORDER STATEMENT OF WORK**

**1.0 PROJECT OBJECTIVES**

1.1. SECTION ORGANIZATION

**2.0 SCOPE**

2.1. COMPANY OPERATIONS FACILITY

2.2. SITE

2.3. GOVERNMENT-FURNISHED GOVERNMENT INSTALL EQUIPMENT (GFGI)

2.4. FURNITURE REQUIREMENTS

**3.0 COMPANY OPERATIONS FACILITY**

3.1. GENERAL REQUIREMENTS

3.2. FUNCTIONAL AND AREA REQUIREMENTS

**4.0 APPLICABLE CRITERIA**

4.1. INDUSTRY CRITERIA

4.2. MILITARY CRITERIA

**5.0 GENERAL TECHNICAL REQUIREMENTS**

5.1. SITE PLANNING AND DESIGN

5.2. SITE ENGINEERING

5.3. ARCHITECTURE AND INTERIOR DESIGN

5.4. STRUCTURAL DESIGN

5.5. THERMAL PERFORMANCE

5.6. PLUMBING

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

5.8. HEATING, VENTILATING AND AIR CONDITIONING

5.9. ENERGY CONSERVATION

5.10. FIRE PROTECTION

5.11. SUSTAINABLE DESIGN

5.12. CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT

5.13. SECURITY (ANTI-TERRORISM STANDARDS)

**6.0 PROJECT SPECIFIC REQUIREMENTS**

- 6.1. GENERAL
- 6.2. APPROVED DEVIATIONS
- 6.3. SITE PLANNING AND DESIGN
- 6.4. SITE ENGINEERING
- 6.5. ARCHITECTURE
- 6.6. STRUCTURAL DESIGN
- 6.7. THERMAL PERFORMANCE
- 6.8. PLUMBING
- 6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS
- 6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS
- 6.11. HEATING, VENTILATING AND AIR CONDITIONING
- 6.12. ENERGY CONSERVATION
- 6.13. FIRE PROTECTION
- 6.14. SUSTAINABLE DESIGN
- 6.15. ENVIRONMENTAL
- 6.16. PERMITS
- 6.17. DEMOLITION
- 6.18. ADDITIONAL FACILITIES

## 1.0 PROJECT OBJECTIVES

1.0.1 The project objective is to design and construct facilities for the military that are consistent with the design and construction practices used for civilian sector projects that perform similar functions to the military projects. For example, a Company Operations Facility has the similar function as an office/warehouse in the civilian sector; therefore the design and construction practices for a company operations facility should be consistent with the design and construction of an office/warehouse building.

### Comparison of Military Facilities to Civilian Facilities

Military Facility	Civilian Facility
Company Operations Facility (COF)	Office Warehouse

1.0.2 It is the Army's objective that these buildings will have a 25-year useful design life before a possible re-use/re-purpose or renovation requirement, to include normal sustainment, restoration, modernization activities and a 50-year building replacement life. Therefore, the design and construction should provide an appropriate level of quality to ensure the continued use of the facility over that time period with the application of reasonable preventive maintenance and repairs that would be industry-acceptable to a major civilian sector project OWNER. The site infrastructure will have at least a 50-year life expectancy with industry-accepted maintenance and repair cycles. The project site should be developed for efficiency and to convey a sense of unity or connectivity with the adjacent buildings and with the Installation as a whole.

1.0.3 Requirements stated in this contract are minimums. Innovative, creative, and life cycle cost effective solutions, which meet or exceed these requirements are encouraged. Further, the OFFEROR is encouraged to seek solutions that will expedite construction (panelization, pre-engineered, etc.) and shorten the schedule. **The intent of the Government is to emphasize the placement of funds into functional/operational requirements. Materials and methods should reflect this by choosing the most economical Type of Construction allowed by code for this occupancy/project allowing the funding to be reflected in the quality of interior/exterior finishes and systems selected.**

## 1.1 SECTION ORGANIZATION

This Section is organized under 6 major "paragraphs".

- (1) Paragraph 1 is intended to define the project objectives and to provide a comparison between the military facility(ies) and comparable "civilian" type buildings.
- (2) Paragraph 2 describes the scope of the project.
- (3) Paragraph 3 provides the functional, operational and facility specific design criteria for the specific facility type(s) included in this contract or task order.
- (4) Paragraph 4 lists applicable industry and government design criteria, generally applicable to all facility types, unless otherwise indicated in the Section. It is not intended to be all-inclusive. Other industry and government standards may also be used, where necessary to produce professional designs, unless they conflict with those listed.
- (5) Paragraph 5 contains Army Standard Design Criteria, generally applicable to all facility types, unless otherwise indicated in the Section.
- (6) Paragraph 6 contains installation and project specific criteria supplementing the other 5 paragraphs.

## **2.0 SCOPE**

### **2.1. COMPANY OPERATIONS FACILITY (COF)**

Provide Company Operations Facilities (COF). This project type is to house Company administrative operations and store and move supplies. It is intended to be similar to office and warehouse type buildings in the private sector community.

The project will include Company Operations Facilities for 2 Companies. The number of unified companies (UNICOF) per battalion and number of personnel per company for this project is as follows:

6 Hosp Co, 84 Bed NSB (UNICOF)

Company A = 150 Personnel, male/female ratio 80:20

Company B = 150 Personnel, male/female ratio 80:20

The maximum allowable gross area for the Admin Module is 8412 square feet.

The maximum allowable gross area for the Readiness Module is 18810 square feet.

The maximum allowable gross exterior covered Hardstand area is 4656 square feet.

The preferred design approach for this complex is the UNICOF with integrated admin layout

A Troop Aid Station to support the Brigade IS NOT required



## 2.2. SITE:

Provide all site design and construction within the COF limits of construction necessary to support the new building facilities. Supporting facilities include, but are not limited to, utilities, electric service, exterior and security lighting, fire protection and alarm systems, security fencing and gates, water, gas, sewer, oil water separators, storm drainage and site improvements. Include Antiterrorism/Force Protection measures the facility design in accordance with applicable criteria.

Maintain the construction site and haul route. Repair/replace damage to existing sidewalks, pavements, curb and gutter, utilities, and/or landscaping within the construction limit, adjacent to the construction site, and along the Contractor's haul route resulting from the Contractor's construction activities at no additional cost to the Government. Prior to construction activities, the Contractor and Contracting Officer Representative shall perform an existing condition survey. At the completion of the Task Order, the Contractor and Contracting Officer representative shall perform a final condition survey to determine repair/replacement requirements.

Approximate area available for this (these) facility(ies) is shown on the drawings.

Provide all site improvements necessary to support the new building facilities. Refer to Paragraph 6.

Approximate area available 4.56 acres

## 2.3. GOVERNMENT-FURNISHED GOVERNMENT-INSTALLED EQUIPMENT (GFGI)

Coordinate with Government on GFGI item requirements and provide suitable structural support, brackets for projectors/VCRs/TVs, all utility connections and space with required clearances for all GFGI items. Fire extinguishers are GF/GI personal property, while fire extinguisher brackets and cabinets are Contractor furnished and installed CF/CI. All Computers and related hardware, copiers, faxes, printers, video projectors, VCRs and TVs are GFGI.

The following are also GFGI items: None

## 2.4. FURNITURE REQUIREMENTS

Provide furniture design for all spaces listed in Chapter 3 and including any existing furniture and equipment to be re-used. Coordinate with the user to define requirements for furniture systems, movable furniture, storage systems, equipment, any existing items to be reused, etc. Early coordination of furniture design is required for a complete and usable facility.

The procurement and installation of furniture is NOT included in this contract. Furniture will be provided and installed under a separate furniture vendor/installer contract. The general contractor shall accommodate that effort with allowance for entry of the furniture vendor/installer onto this project site at the appropriate time to permit completion of the furniture installation for a complete and usable facility to coincide with the Beneficial Occupancy Date (BOD) of this project. The furniture vendor/installer contract will include all electrical pre-wiring and the whips for final connection to the building electrical systems however; the general contractor shall make the final connections to the building electrical systems under this contract. Furthermore, the general contractor shall provide all Information/Technology (IT) wiring (i.e. LAN, phone, etc.) up to and including the face plate of all freestanding and/or systems furniture desk tops as applicable, the services to install the cable and face plates in the furniture, the coordination with the furniture vendor/installer to accomplish the installation at the appropriate time, and all the final IT connections to the building systems under this contract.

The Government reserves the right to change the method for procurement of and installation of furniture to Contractor Furnished/Contractor Installed (CF/CI). CF/CI furniture will require competitive open market procurement by the Contractor using the Furniture, Fixtures and Equipment (FF&E) package.

## 2.5. NOT USED

### 3.0 COMPANY OPERATIONS FACILITY (COF)

#### 3.1. General Requirements:

COFs provide administrative and supply facilities for unit personnel functions and storage of their equipment. These facilities serve as the primary staging, training, and deployment center for personnel and their individualized gear.

##### 3.1.1. Facility Relationships

COFs are typically located within an operations complex along with Tactical Equipment Maintenance Facilities (motor pools) and Battalion/Brigade HQ. The facilities within this complex shall be oriented to support deployment and daily operations, and should also be located within walking distance of associated community facilities such as barracks and dining facilities.

##### 3.1.2. Gross Building Area

Gross areas of facilities shall be computed according to subparagraphs below. Maximum gross area limits indicated in Paragraph 2.0, SCOPE, may not be exceeded. A smaller overall gross area is permissible if all established net area program requirements are met.

- (1) **Enclosed Spaces.** The gross area includes the total area of all floors, including basements, mezzanines, penthouses, usable attic or sloping spaces used to accommodate mechanical equipment or for storage with an average height of 6'-11" measured from the underside of the structural system and with the perimeter walls measuring a minimum of 4'-11" in height, and other enclosed spaces as determined by the effective outside dimensions of the building. (NOTE: Exterior Covered Hardstand area associated with Company Operations Facilities shall be calculated as enclosed space, i.e. full scope).
- (2) **One-Half Spaces.** One-half of the area will be included in the gross area for balconies and porches; exterior covered loading platforms or facilities, either depressed, ground level, or raised; covered but not enclosed passageways or walks; covered and uncovered but open stairs; and covered ramps.
- (3) **Excluded Spaces.** Crawl spaces; exterior uncovered loading platforms or facilities, either depressed, ground level, or raised; exterior insulation applied to existing buildings; open courtyards; open paved terraces; roof overhangs and soffits for weather protection; uncovered ramps; uncovered stoops; and utility tunnels and raceways will be excluded from the gross area.

##### 3.1.3. Functional Spaces

Net area requirements for functional spaces are included in the space program table (Table 2). If net area requirements are not specified in the Statement of Work, the space shall be sized to accommodate the required function, comply with code requirements, comply with overall gross area limitations and other requirements of the RFP (for example, area requirements for corridors, stairs, and mechanical rooms will typically be left to the discretion of the Offeror).

##### 3.1.4. Handicapped Access

COFs are intended for use by able-bodied military personnel only, therefore, are not required to meet handicapped accessible requirements.

##### 3.1.5. Site Design and Functional Area

Site features include service yard and service yard drives, utilities, and site improvements.

##### 3.1.6. Adapt-Build Model

An Adapt-Build Model for a COF, which contains a fully developed design, including a Building Information Model (BIM), 2-D CADD files, and specifications, can be downloaded from the following FTP site: <ftp://ftp.usace.army.mil/pub/sas/COF/>. This design is provided as a guide that exemplifies a technically suitable

product and incorporates mandatory functional/operational requirements for a similar (although perhaps not an exact) facility to be constructed under this solicitation. It will be left to the offerors' discretion if, and how, they will use the sample design provided to satisfy the requirements of this Request for Proposal. This model is not intended to modify or over-ride specific requirements of this RFP and, under all circumstances, it will be incumbent upon the successful offeror to adhere to the site specific scope and functional/operational requirements specified within the RFP. Neither this statement of work, nor the adapt-build model, are intended to diminish the offeror's responsibilities under the clauses titled "Responsibility of the Contractor for Design," "Warranty of Design," and "Construction Role During Design." The successful offeror shall be the designer-of-record and shall be responsible for the final design and construction product, including but not limited to, adherence to the installation architectural theme, building code compliance and suitability of the engineering systems provided. The government assumes no liability for the model design provided and, to the extent it is used by an offeror, the offeror will be responsible for all aspects of the design as designer-of-record.

### 3.2. FUNCTIONAL AND OPERATIONAL REQUIREMENTS

#### 3.2.1. General

COF functional layout and adjacency requirements are as indicated on drawings. The extent to which the drawings represent required or preferred layouts and the allowable latitude for changes to them is as noted on the drawings. COFs should be easily adaptable to accommodate variations in size and number of companies in the Army's future force. The design objective of the basic battalion level COF complex is to provide a flexible facility suitable to a mix of battalions of varying composition while utilizing a modular approach.

#### 3.2.2. Functional Areas

The COF is comprised of three vertical construction components consisting of an Administrative Module, Readiness Module, and exterior covered hardstand. In conjunction with this, each site-specific project shall include necessary site amenities, such as vehicle service yards, access drives, equipment wash stations, and exterior utilities. These components are more fully described below.

- (1) Administration Module. Space shall be provided for the following administration and support functions:
  - (a) Private offices for the Commander, First Sergeant, Executive Officer and Training Room
  - (b) Space for printer and fax machines, waste and paper recycling receptacles, and supply closet for storage
  - (c) Shared office space for platoon leaders and platoon sergeants
  - (d) Conference space for meetings and/or training
  - (e) Showers, locker room, and latrines to serve both the administrative personnel assigned to the company and for off post personnel – a place for commuters to shower and change after PT
  - (f) Consolidated utility spaces to serve the entire facility including a mechanical room, electrical room, telecommunication rooms (including SIPRNet), janitor's closet, vending area to also accommodate recycling receptacles and recycling storage closet. Accommodation for Secure Internet Protocol Routing Network (SIPRNet) shall be constructed in accordance with AR 380-5, Chapter 7.
- (2) Readiness Module. Space will be provided for the following operational and supply functions:
  - (a) Readiness Bays to provide accommodation for individual combat equipment (TA-50) lockers (CFCI) for all unit personnel, plus co-located area for equipment maintenance, training, and pre-deployment preparations. Interior equipment maintenance area will be nominally sized so that up to 50 percent of the unit personnel can layout TA-50 gear simultaneously, based on providing 40 square feet (5-foot by 8-foot plus a circulation factor) for each layout space. Each company area shall accommodate forklift access from the readiness bay to the exterior loading areas. The bay floor shall be capable of supporting forklift movement throughout the area. Slab shall be designed for forklift truck maximum axle load of 5 kips and maximum load capacity of 2 kips. Interior mud wash utility sinks shall be provided in the Readiness Areas. Sinks shall be allocated on the basis of one utility sink for every 50 soldiers in the company.
  - (b) Supply Bays to provide storage space for company supplies and equipment - Tables of Equipment (TOE) and Common Tables of Allowance (CTA), weapons, and consumable supplies (including items awaiting issue, turn-in, or repair). Also, it provides accommodation for the supply sergeant, supply clerk(s) and the armorer in performing shipping and receiving functions. Specific storage areas included in the supply bay include:

- Weapons vault for storage of arms, ammunition, and explosives (AA&E)
- Secure storage room for non-sensitive items (high value items, other than AA&E, for which accountability is a concern)
- Nuclear, biological, and chemical (NBC) equipment storage
- Communications equipment storage
- Consumable unit storage

(c) Accommodation for overflow/expansion from either admin or storage spaces. This provision shall be accomplished by the utilization of a mezzanine over the entire open area of the Readiness Module, within the area limitations of IBC and NFPA 101. The drawings indicate preferred overflow/expansion arrangements that meet user operability requirements. The expansion space indicated on the drawings shall be provided at the time of initial project construction.

(3) Exterior Covered Hardstand. Outside sheltered space for equipment maintenance, weapons cleaning, and pre-deployment preparation. This area shall be sized in accordance with Paragraph 2.0 SCOPE. The preference is to provide a column free interior to the greatest extent possible to allow for the greatest flexibility in use. The minimum canopy height shall be 14'-0" or such height as required to allow for operational truck access. The minimum clear depth shall be 30'-0".

### 3.2.3. COF Army Standards

The following items are the Army mandatory features for the COFs.

(1) Battalion Centric Design. Design that consolidates COFs for an entire battalion in a single building. The design standard is intended to create a facility that consolidates between three and eight companies of a battalion in a single building. This single building can be reconfigured internally without changing the footprint of the building if the battalion structure changes.

(2) Open, Flexible Design for Admin and Readiness Modules. Open, flexible design for both admin and readiness modules, easy to reconfigure in response to changes in force structure, equipment, and doctrine. Consistent with the battalion centric focus, both the admin and the readiness (supply) modules will employ design features that are durable but reconfigurable without altering the structural design of the building. The goal is to allow ready adaptability in response to changes in force structure, equipment, and doctrine. The addition of internal load bearing structures that limit design flexibility will not be permitted.

(3) TA-50 Lockers. Individual combat equipment (TA-50) lockers in sufficient quantity to meet the upper limit of the design capacity of the facility (100 percent of maximum personnel in each company). Provide permanently installed, individual steel lockable lockers sized 42" (w) x 24" (d) x 78" (h) to allow each soldier to securely store current TA-50 as well as future Soldier Systems equipment.

(4) Interior Operations and Maintenance Area. The interior space of the readiness module is intended to provide space for equipment maintenance and pre/post-deployment checks, as well as other unit preparatory and training requirements. The space includes the provision for individual TA-50 and other equipment storage, and future fielding of Soldier Systems equipment. The space is to be nominally sized to provide 40 SF layout areas for 50 percent of the upper limit of the design capacity of the facility (50 percent of the maximum personnel). Variations to the locker arrangement shown in the drawings are permitted, but may result in a reduced number of layout spaces. Revised configurations that reduce the available layout area to less than 25 percent of the design capacity of the readiness module will not be permitted. The readiness module will be designed to accommodate the use of fork lifts. In addition to the above, wire mesh cage storage shall be provided for unit supply, NBC, and communications equipment located at the supply bay area .

(5) Exterior Covered Hardstand. Exterior covered hardstand adjacent to the Readiness Module will be provided for each company to accommodate outside equipment maintenance, weapons cleaning, pre/post-deployment preparation, vehicle loading, close formation, etc. This space is to be nominally sized to provide 40 SF layout areas for 25 percent of the upper limit of the design capacity of the facility (25 percent of the maximum personnel). Water, lighting, and electrical connections shall be provided.

(6) Arms Vaults. Arms vaults to accommodate storage of arms, ammunition and explosives (AA&E) shall be provided for each company. These vaults shall be designed in accordance with physical security requirements contained in AR 190-11, Appendix G. An option exists for use of prefabricated, modular vaults conforming to Fed. Spec. AA-V-2737 requirements. Provide a GSA approved Class 5 Armory vault door with lock in accordance with Fed. Spec. AA-D-600D and a Dutch style day gate with issue port.

(7) Non-Sensitive Secure Storage (other than AA&E). Intent is to provide secure storage of items with a high dollar value or items for which command accountability is required. The room shall be constructed of material to prevent forcible entry. The minimum acceptable construction is expanded steel fabric behind impact resistant gypsum board at both walls and ceiling. The door should provide an equivalent degree of security, and as a minimum, should be constructed of sheet metal material not less than 16 gauge in thickness and be equipped with a hasp to accommodate a high security padlock.

(8) Consolidated Showers and Latrines. A single set of shower/latrine facilities will be provided for each combined COF (UNICOF). The design layout shall allow adjustment for the ratio of males and females in any unit by repositioning the dividing wall between their facilities at the time of initial construction. The facilities will have both access to these facilities. Lockers with benches will be provided on a 3:1 ratio of lockers/shower. Minimum locker size shall be 12"(w)x18"(d)x36"(h).

(9) Economy of Construction to Suit Function. Designers shall consider economy of construction to suit the function, i.e. warehouse or light industrial type facilities.

(10) Operational Site Orientation. Operational facility relationships require locating COFs within a complex with direct access to the unit motor pool or other corresponding work areas. The intent is to provide a single battalion centric complex containing facilities to support company operations and vehicle maintenance in a single fenced compound. When site conditions do not permit this configuration, COFs should be placed adjacent to the vehicle maintenance complex to facilitate the movement of personnel and equipment between the two facilities.

### 3.3. TECHNICAL REQUIREMENTS

#### 3.3.1. Site Design

The following site design requirements are applicable to the design of COFs:

##### (1) Exterior Covered Hardstand

Provide an exterior covered hardstand adjacent to the readiness module. Provide weatherproof lighting and weatherproof general purposes receptacles with ground fault protection. Lighting control shall be provided with local switches with photocell override. Provide one duplex receptacle for every two columns. The concrete pavement under the Covered Hardstand shall have a slope of no more than 2%.

##### (2) Service Yard

Provide a rigid concrete pavement for the service yard from the Readiness Module/Exterior Covered Hardstand (depending on site layout) to the project demarcation line. The service yard shall be a minimum of 80' deep in order to accommodate up to a 35-foot long vehicle with a 45-foot turning radius along the entire length of the Readiness Module/Exterior Covered Hardstand. The service yard shall be sloped to drain away from the Readiness Module/Exterior Covered Hardstand area with a slope of no more than 2%. Provide accommodation for boot/TA-50 gear equipment washing, drainage, and grit removal. Provide one boot/TA-50 gear washing station per company. Each wash station shall include four freeze proof hose bibb and drying rack (handrail).

##### (3) Entrance Drive into Service Yard

Provide two 28-foot wide rigid concrete pavement entrance drives from the Service Yard to an adjacent roadway. Service drives shall be located on opposite sides of the service yard.

##### (4) Bollards

Provide 6-inch diameter by 5-foot high, concrete-filled, schedule 80 galvanized steel pipe bollards, 5-foot O.C. spacing, painted safety yellow for each column of the exterior covered hardstand located adjacent to the service yard where frequent vehicle movement increases the risk of damage by vehicle impact. Also, provide bollards 5 feet from the edge of electrical and mechanical equipment, and to protect the corners of Admin/Readiness buildings. Bollard footings shall be designed to withstand vehicular impact.

##### (5) Privately Owned Vehicles (POV) Parking

POV parking shall be provided at the ratio of one space for every two people for the maximum design capacity of all Company Operations Facilities.

### 3.3.2. Architectural Design

- (1) Exterior architectural features of the building shall be designed based on the following and in accordance with the established Installation architectural theme.
- (2) The Readiness Module shall be constructed to meet the requirements of a Risk Level II analysis in accordance with AR 190-51 and AR 190-13. In conjunction with this, it has been determined that a minimum exterior wall construction consisting of 26 gauge metal wall panels with insulation and an interior metal liner panel extended to a height 8' above the finished floor will satisfy the minimum Risk Level II requirements of AR 190-51, Appendix B-2, paragraph c. The minimum interior wall construction for dividing walls between company readiness areas shall consist of a stud wall with impact resistant gypsum wall board each side.
- (3) Natural Lighting. Provide windows for natural lighting and ventilation in all office areas wherever possible. All operable windows provided shall have locks and insect screens. Preference is for natural lighting to be provided at Readiness Areas to the greatest extent possible.
- (4) Sound Insulation. Provide sound insulation in all administration areas to meet a minimum rating of STC 42 at walls and floor/ceiling assemblies, and a rating of STC 33 for doors, which are to be solid core wood in a metal frame. In addition to the sound insulation required, conference areas shall meet a Noise Criteria (NC) 30 rating in accordance with ASHRAE Fundamentals Handbook.
- (5) Office and Administrative Areas. The preference is to provide maximum flexibility for future change within office and administration areas. The command section offices shall be constructed to provide privacy and sound control in accordance with SOUND INSULATION paragraph above. The intent for these areas is to minimize load-bearing walls to the greatest extent possible so as to accommodate future reconfiguration of spaces. This same construction requirement is also applicable to walls between companies in the readiness areas.
- (6) TA-50 Storage Lockers. TA-50 lockers shall be provided as indicated in Paragraph 3.2.3 (3), with size and appearance similar to that shown below. TA-50 lockers shall be single tier, heavy duty, all welded ventilated type and meet the following minimum requirements:
  - (a) All tops, bottoms and shelves shall be constructed of minimum 16 gauge thick cold rolled sheet steel. All sides, intermediate partitions and backs shall be constructed of minimum 14 gauge flattened expanded metal or perforated metal with a minimum free area of 50%, welded to angle iron frames. Frames shall be constructed of minimum 1" X 1" X 1/8" angle iron steel. Thickness of metal and details of assembly and supports shall provide strength and stiffness.
  - (b) Double doors shall have a three-point three-sided cremone latch and shall be padlockable. Doors shall be hinged with minimum five knuckle heavy duty steel pin butt hinges welded to both door and locker frame – provide three hinges per single tier door.
  - (c) Each locker shall include: one aluminum number plate (numbered in sequential order), one full width shelf located 12" from the top with clothes hangar rod and three locker hooks mounted below.
  - (d) Lockers shall be galvanized and coated with a high quality durable finish with color to be manufacturer's standard tan or gray.
  - (e) Locker shall be anchored to concrete floor in accordance with manufacturer's recommendations.

### 3.3.3. Fire Protection

#### (1) Standards and Codes

All fire protection and life safety features shall be in accordance with UFC 3-600-01 and the criteria referenced therein. COFs shall be classified as mission essential and shall be provided with sprinkler protection.

#### (2) Fire Protection and Life Safety Analysis

A fire protection and life safety design analysis shall be provided for all buildings in the project. The analysis shall be submitted with the interim design submittal. The analysis shall include classification of occupancy (both per the IBC and NFPA 101); type of construction; height and area limitations (include calculations for allowable area increases); life safety provisions (exit travel distances, common path distances, dead end distances, exit unit width required and provided); building separation or exposure protection; specific compliance with NFPA codes and the IBC; requirements for fire-rated walls, doors, fire dampers, etc.; analysis of automatic suppression systems and protected areas; water supplies; smoke control systems; fire alarm system, including connection to the base-wide system; fire detection system; standpipe systems; fire extinguishers; interior finish ratings; and other pertinent fire

protection data. The submittal shall include a life safety floor plan for all buildings in the project showing occupant loading, occupancy classifications and construction type, egress travel distances, exit capacities, areas with sprinkler protection, fire extinguisher locations, ratings of fire-resistive assemblies, and other data necessary to exhibit compliance with life safety code requirements.

(3) Sprinkler System

Provide complete sprinkler protection for Company Operations Facilities, including both Administrative Modules and Readiness Modules, designed in accordance with UFC 3-600-01 and NFPA 13. Wet pipe sprinkler systems shall be provided in areas that are heated and dry pipe sprinkler systems shall be provided in areas subject to freezing. The Covered Hardstand, if not separated by adequate distance per the IBC, Table 602, shall be considered to be part of the COF facility and shall require sprinkler protection. The sprinkler system design shall be in accordance with UFC 3-600-01 and NFPA 13. The sprinkler hazard classifications shall be in accordance with UFC 3-600-01, NFPA 13, and other applicable criteria. Design densities, design areas and exterior hose streams shall be in accordance with UFC 3-600-01. The sprinkler systems shall be designed and all piping sized with computer generated hydraulic calculations. The exterior hose stream demand shall be included in the hydraulic calculations. A complete sprinkler system design, including sprinklers, branch lines, floor mains and risers, shall be shown on the drawings. The sprinkler system plans shall include node and pipe identification used in the hydraulic calculations. All sprinkler system drains, including main drains, test drains, and auxiliary drains, shall be routed to a 2-foot by 2-foot splash block at exterior grade.

(a) Sprinkler Service Main and Riser

The sprinkler service main shall be a dedicated line from the distribution main. Sprinkler service and domestic service shall not be combined. The sprinkler service main shall be provided with an exterior post indicator valve with tamper switch reporting to the fire alarm control panel (FACP). The ground floor entry penetration shall be sleeved per NFPA 13 requirements for seismic protection. The sprinkler entry riser shall include a double check backflow preventer, a fire department connection, and a wall hydrant for testing of backflow preventer. The sprinkler system shall include an indicating control valve for each sprinkler system riser, a flow switch reporting to the FACP, and an exterior alarm bell. All control valves shall be OS&Y gate type and shall be provided with tamper switches connected to the FACP. Facilities with multiple floors shall be provided with floor control valves for each floor. The floor control valve assembly shall be in accordance with UFC 3-600-01, Figure 4-1.

(b) Exterior Hose Stream

Exterior hose stream demand shall be in accordance with UFC 3-600-01. Exterior hose stream demand shall be included in the sprinkler system hydraulic calculations.

(c) Backflow Preventer

A double check backflow preventer shall be provided on the fire water main serving each building. This shall be located within the building. An exterior wall hydrant with dual hose connections with OS&Y valve shall be provided to allow testing of backflow preventer at design flow as required by NFPA 13.

(d) Fire Department Connection

A fire department connection shall be provided for each building with sprinkler protection. These shall be located to be directly accessible to the fire department.

(4) System Components and Hardware

Materials for the sprinkler system, fire pump system, and hose standpipe system shall be in accordance with NFPA 13 and NFPA 20.

(5) Protection of Piping Against Earthquake Damage

Sprinkler and fire pump piping systems shall be protected against damage from earthquakes. Seismic protection shall include flexible and rigid couplings, sway bracing, seismic separation assemblies where piping crosses building seismic separation joints, and other features as required by NFPA 13 for protection of piping against damage from earthquakes.

(6) Fire Water Supply

Fire flow test data is provided in Appendix D.

(7) Fire Pump

The requirement for a fire pump installation shall be determined by the Contractor based on fire flow test data from the project site and fire protection system design requirements for the project. If required a complete fire pump installation shall be provided for the facility. It shall comply with the requirements of UFC 3-600-01, NFPA 13 and NFPA 20. The Contractor shall submit fire pump design analysis and drawings in the design requirements.

(8) Fire Detection and Alarm

Refer to Paragraph 3.3.7, Electrical and Communication Systems, for requirements.

(9) Building Construction

Construction shall comply with requirements of UFC 3-600-01, the International Building Code and NFPA 101.

(a) Fire Extinguisher Cabinets and Brackets

Fire Extinguisher cabinets and brackets shall be provided when fire extinguishers are required by UFC 3-600-01 and NFPA 101. Placement of cabinets and brackets shall be in accordance with NFPA 10. Semi-recessed cabinets shall be provided in finished areas and brackets shall be provided in non-finished areas (such as utility rooms, storage rooms, shops, and vehicle bays). Fire extinguishers shall not be provided in this contract.

(b) Interior Wall and Ceiling Finishes

Interior wall and ceiling finishes and movable partitions shall conform to the requirements of UFC 3-600-01 and NFPA 101.

3.3.4. Thermal Performance

See Paragraph 5.

3.3.5. Plumbing

(1) Exterior Wall Hydrants

In addition to wall hydrants provided around perimeter of building(s), one additional freeze-proof exterior wall hydrant or wall faucet per company shall be provided at the hardstand.

(2) Domestic Hot Water System

The main water heating equipment shall be located within a mechanical room, and also located on the ground floor level only. Instantaneous water heaters are not allowed to be used for hot water serving all COF areas except Readiness Area. System storage and recovery shall be sized to deliver sufficient capacity for all showers, for a continuous duration of ninety (90) minutes. Usage diversity factor for the showers shall be one. Minimum system total storage of water heater(s) shall be 400 gallons for 1- and 2-company COFs, and 600 gallons for 3-company and larger COFs.

3.3.6. Heating, Ventilating, and Air Conditioning

(1) Administrative Areas

See Paragraph 5 for heating and cooling of administrative areas. The admin building's HVAC system design should include flexibility in zoning to where it can address future changes in occupant densities (e.g., a platoon office suite converted to a conference room). Administrative areas shall be temperature-controlled by the DDC system. Temperature setpoint adjustment shall be accomplished via DDC System by authorized personnel.

(a) Communications and SIPRNet rooms will each be served by an independent and dedicated air-handling system. Air handling unit system(s) shall not be floor-space mounted within the actual space served. Rooms shall be maintained at 72 degrees F and 50 percent relative humidity year-round. Assume 1775 BTU per hour for the equipment heat dissipation. Contractor shall verify this load during the design stage.

(2) Readiness Areas



The readiness module shall be heated and air conditioned. Separate air side equipment (heating, ventilation and air conditioning units) shall be provided for each readiness module. Indoor design temperature for heating shall be 55 degrees F, and for cooling the indoor design conditions shall be 80 degrees F dry bulb with a maximum 60 percent relative humidity. Whenever the indoor dry bulb temperature and/or the maximum relative humidity is exceeded, the air conditioning unit shall run, and shall continue to run until the design dry bulb temperature and the relative humidity requirements are satisfied. The air conditioning unit serving the readiness area shall be capable of providing outside air quantities, in accordance with ASHRAE 62.1, for the design people load of the readiness area. Arms vaults shall be cooled to 80 degrees F with room air to be 100% exhausted. Ventilation for Arms Vaults shall be provided in accordance with ASHRAE 62.1 requirements for storage rooms. Communication rooms located in Readiness Building will be served by an independent and dedicated air-handling system and shall be conditioned per Administrative Areas paragraph requirements. Administrative-type areas located within the Readiness Building shall be conditioned per Paragraph 5 requirements.

### (3) HVAC Controls

HVAC Controls shall be in accordance with paragraph 5.8.3. See Appendix for HVAC Controls for typical control system points schedules. These schedules identify as a minimum points to be monitored and controlled by the building automation system (BAS). See paragraph 6 for any additional installation specific points. The points schedule drawings convey a great deal of information critical to the design, installation, and subsequent performance of the control system. It includes hardware input/output information, device ranges and settings, ANSI 709.1 communication protocol data, and information about data that is to be used at the operator workstation by the Monitoring and Control software. These schedules are available as an excel spread sheet and as AutoCAD drawings on the Engineering Knowledge Online (EKO) website <https://eko.usace.army.mil/fa/bas/>. Point schedule of system types not addressed in the appendix shall be developed by the Contractor, and shall be sufficiently detailed to a level consistent to a similar listed system in the appendix. It is recommended that all of the guidance and instruction documents be reviewed prior to using any of the info, as the documents provide necessary and critical information to the use of the website drawings and other information.

#### 3.3.7. Electrical and Communications

See Paragraph 6 for clarifications and additional requirements for the electrical and communication systems.

### (1) Interior Electrical and Communications

#### (a) Electrical

1. Characteristics. Select electrical characteristics of the power system to provide a safe, efficient, and economical distribution of power, based upon the size and types of loads to be served. Use distribution and utilization voltages of the highest level that is practical for the load to be served.

2. Nonlinear Loads. The effect of nonlinear loads such as computers and other electronic devices shall be considered and accommodated as necessary. These loads generate harmonics, which can overload conventionally sized conductors or equipment and thereby cause safety hazards and premature failures. Circuits serving such devices shall be equipped with a separate neutral conductor not shared with other circuits. Panelboards and any dry type transformers shall be rated accordingly.

3. Lightning Protection System and Transient Voltage Surge Protection. Design shall be in accordance with NFPA 780 and other referenced criteria. Provide transient voltage surge protection.

4. Receptacles. Power receptacles shall be provided per NFPA 70 and in conjunction with the proposed equipment and furniture layouts. Provide power connectivity to each workstation. Power poles shall not be used. Provide duplex receptacles adjacent to each duplex (voice/data) outlet and CATV outlet.

(b) Lighting. Lighting and lighting controls shall comply with the recommendations of the Illumination Engineering Society of North America (IESNA) and the requirements of ASHRAE 90.1.

1. Interior Lighting. Interior ambient illumination shall provide a generally glare free, high quality lighting environment and conform to IESNA RP-1-04.

#### (c) Telecommunication

1. Telecommunications Rooms. Telecommunications Rooms shall be provided for voice and data as shown on the standard design layouts. The telecommunications rooms shall be designed in accordance with the I3A Criteria.

2. Telecommunications Outlets. Telecommunications outlets shall be provided per the I3A Technical Criteria based on functional purpose of the various spaces with the facility as modified by user special operational requirements. All COF workstations\desks shall have voice and data connection capability. All conference rooms shall have voice and data connection capability (minimum four outlets). A wall telephone outlet with a single jack shall be provided in each mechanical room, electrical room, arms vault and communications room and entrances/exits in the Readiness Modules. Provide a duplex outlet (voice/data) for a network printer/copier in the vending area, in the storage room adjacent to each suite and in the corridor to the offices. Provide a duplex (voice/data) outlet at the desk in each of the Storage Rooms and Arms Vault in the Readiness Module. Telecommunications infrastructure shall meet the Installation Information Infrastructure Architecture (I3A) Criteria and ANSI/TIA/EIA requirements.

3. Cable Trays. Provide cable tray pathways through-out the facility (Admin and Readiness Modules) to support the systems required for the construction of the facility as well as user's computer networks, video integration system, telecommunication systems and other specialized electronic systems.

4. For Detached Readiness Modules, provide a separate communication room on the mezzanine as shown with the integrated Admin Option of the floor plans. The telecommunications rooms shall be designed in accordance with the I3A Criteria and ANSI/EIA/TIA-569-B. Where copper cable runs exceed 295 feet, provide additional telecommunication rooms on the mezzanine as required. The incoming telephone service (voice and data) shall be from the nearest manhole or from the main telephone communication room in the Admin Module, size the cables and conduits as per I3A Criteria.

1. All copper cabling leaving one building to go to another shall be treated as OSP cable and follow OSP cable requirements as stated in section 3.5.4 of the I3A and I3MP Grounding and Bonding Guide; this includes use of protector blocks and other grounding requirements as necessary to avoid lightning issues resulting in damaging of IT equipment.

2. Option to use fiber cable via OSP cable is authorized from the main TR and will be terminated inside the next building on a fiber distribution panel, rack, or cabinet as required, with a minimum of 6-strands.

(d) SIPRNET

1. The SIPRNET room and infrastructure shall be designed and constructed in accordance with the "Building SIPRNET Communication Room – New Construction Guidance", paragraph of the Technical Guide for the Integration of SIPRNET (Secret Internet Protocol Router Network). The SIPRNET building infrastructure design and installation shall be coordinated with the local NEC.

a. The Communication Room and the SIPRNET Room can be combined into a single room if a SIPRNET safe/container can be used. Coordinate this option with the local NEC.

2. In the NSTISSI 7003 and the Technical Guide for Integration of SIPRNET, paragraph "Protective Distribution System", the word "shall" shall be substituted for the word "should" or "will" in this paragraph.

3. Install one SIPRNET outlet with one drop in each Company Commander's office. Install one SIPRNET outlets with four drops in each unit conference room. The SIPRNET building infrastructure shall use Category 6 UTP copper cables with red cable jacket and red outlet modules unless otherwise directed by the local NEC. Cables shall be terminated in the SIPRNET room and at the outlet in accordance with the I3A Technical Criteria for data cables. Where copper cable runs exceed 295 feet, see guidance in paragraph "Building SIPRNET Communication Room – New Construction Guidance".

4. Specifications Section 27 05 28.39, "SURFACE RACEWAYS FOR COMMUNICATION SYSTEMS" for the SIPRNET Communications System shall be incorporated into the project. Copy of the specifications can be obtained at the following URL: ([ftp://ftp.usace.army.mil/pub/sas/Surface\\_Raceways/](ftp://ftp.usace.army.mil/pub/sas/Surface_Raceways/)). The surface mounted raceway shall be used instead of the surface mounted conduit unless otherwise indicated by the local NEC.

(e) Cable Television. CATV shall be provided in all offices, conference rooms (minimum two outlets), and one in each of the readiness areas. The cable television system shall consist of cabling, pathways, and outlets. All building CATV systems shall conform to APPLICABLE CRITERIA to include I3A Technical Criteria and the UFC 3-580-01 Telecommunications Bldg Cabling Systems Planning/Design.

(f) Audio/Visual Systems. Provisions (consisting of a power receptacle and conduit for signal wiring) for a Government-furnished Government-installed projector shall be provided in each conference room.

(g) Intrusion Detection System. Contractor shall install the necessary conduit, electrical power, and wiring, to support installation of an ICIDS system in each of the Arms Room and SIPRNET Room. The Government normally

installs the signal devices and equipment necessary to activate the system. Contact the Physical Security Office for guidance.

1. If a SIPRNET safe/container is used, ICIIDS may not be required for this room. Contact the Physical Security Office for guidance.

(h) Mass Notification System. A mass notification system shall be provided for each facility and throughout the complex in accordance with UFC 4-010-01. The system shall be fully compatible with and integrated with the local Installation wide Mass Notification System.

(i) Grounding. The ground counterpoise shall be provided around the building perimeter and shall be utilized for grounding incoming service, building steel, telephone service, piping, lightning protection, and internal grounding requirements. Ground straps shall be provided where required by function and will be connected to the building grounding system. Additional grounding may be provided based on project requirements. Systems shall conform to NFPA 70 National Electrical Code, NFPA 780 Lightning Protection Code, local codes, and the US Army I3A Criteria.

(j) Fire Detection and Alarm

1. A fire alarm and detection system shall be provided for this facility. It shall comply with the requirements of UFC 3-600-01 and NFPA 72. The system shall be addressable and fully compatible with and integrated with the local Installation wide Fire Alarm System.

2. All initiating devices shall be connected, Class A, Style 6, to signal line circuits (SLC). All alarm appliances shall be connected to notification appliance circuits (NAC), Class A. A looped conduit system shall be provided so that if the conduit and all conductors within are severed at any point, all NAC and SLC shall remain functional.

3. Breakglass manual fire alarm stations shall not be used.

4. Over-voltage and surge protection shall be provided at the input power of all panels.

(k) Future Soldier LAN Warrior System. Provide a disconnect switch (208/120V, 3 phase, 4 wire) in each of the Secure Non-Sensitive Storage Room in the Readiness Module. Size the disconnect switch(s) and the circuit breaker(s), conductors and conduit(s) from a 208 volt, 3 phase, 4 wire distribution panel to the disconnect switch(s) based on a 200 VA continuous demand load for 100 percent of the maximum personnel in each Company Readiness Area.

### 3.3.8. Energy Conservation

(1) Energy Performance. The building, including the building envelope, HVAC systems, service water heating, power, and lighting systems shall be designed to achieve a non-plug load energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1 (see paragraph 5.9 Energy Conservation). (Note: Plug loads shall be included in building energy modeling but are subtracted in the final calculation of Energy Performance. See section "Design After Award" for additional guidance.)

(2) Required Energy Conservation Features. All items listed in the required energy conservation features table shall be provided as a minimum. Additional energy conservation features may be required to meet the above energy performance. The contractor is responsible for determining and providing additional energy conservation features to meet the energy performance requirements. Where equipment types are indicated, only minimum efficiencies apply.

(3) Compliance Documentation. The required energy conservation features shown in the table above contributes to the achievement of the above energy performance and are life cycle cost effective for a COF. Use of the required energy conservation features does not eliminate the requirement for energy analysis calculations documenting compliance. The D-B contractor must document compliance with the above energy performance utilizing the methodology described in ASHRAE 90.1, Appendix G as discussed in section 01 33 16 Design After Award. The design analysis shall document each of the features selected to achieve the specified energy performance.

(4) Schedules. The following facility schedules must be used in all facility energy simulations for purposes of documenting compliance with energy performance requirements.

### **COF Climate Zone 3A, Energy Conservation Features Table<sub>(8)</sub>**

Item	Component	Minimum Requirements	
		Assembly Max <sup>(2)</sup>	Min R-Value <sup>(2)</sup>
Roof	Insulation Entirely Above Deck	U-0.0388	R-25ci
	Attic and Other		R-38
	Solar Reflectance <sup>(3)</sup>		Cool Roof for Low Slope & Light color all others
Walls	Mass	U-0.0847	R-10
	Steel Framed		R-13 + R-3.8ci
	Wood Framed and Other		R-13
Floors Over Unconditioned Space	Mass	0.0739	R-10.4ci.
	Steel Joist		R-13
	Wood Framed and Other		R-13
Slab-on-Grade	Unheated		NR <sup>(4)</sup>
	Heated	F-0.86	R-15 for 24 in
Doors	Swinging	U-0.70	Uninsulated
	Non-Swinging	U-1.45	Uninsulated
Infiltration		0.25 cfm/ft <sup>2</sup> @ 75 Pa <sup>(5)</sup>	
Vertical Glazing	Window to Wall Ratio (WWR)	< 15%	
	Thermal transmittance	U-0.45	
	Solar heat gain coefficient (SHGC)	0.25	
	South Overhangs	Yes; Projection Factor = 0.4	
Interior Lighting	Lighting Power Density (LPD)	See Lighting Power Table Below <sup>(6)</sup>	
	Occupancy Controls	Manual On/Auto Off (all periodically occupied spaces)	
	Daylighting Controls	NR	
	Plug Load Lighting	Compact Fluorescent (CFL) with electronic ballast	
	All Ballasts	Electronic	
Ducts	Friction rate	0.08 in. w.c./100 feet	
	Sealing	Seal class B	
	Location	Interior only	
	Insulation level	R-6 <sup>(7)</sup>	
Service Water Heating	Gas hot water storage	90% Et	
	Pipe Insulation(d < 1.5in. / d ≥ 1.5 in.)	1 in. / 1.5 in. <sup>(7)</sup>	

**Notes:**

1. **Omitted.**
2. **U-values and R-values** for assemblies and their definitions, requirements, and determinations can be found in ANSI/ASHRAE/IESNA Standard 90.1.
3. **Light colored and cool roofs:** reflect and emit the sun's heat back to the sky instead of transferring it to the building below. "Coolness" is measured by two properties, solar reflectance and thermal emittance. Both properties are measured from 0 to 1 and the higher the value, the "cooler" the roof. A high reflectance keeps much of the sun's energy from being absorbed, while a high thermal emittance radiates away any solar energy that is absorbed, allowing the roof to cool more rapidly. Cool roofs are typically white and

have a smooth surface. Commercial roof products that qualify as cool roofs fall into three categories: single-ply, liquid-applied, and metal panels. The solar reflectance and thermal emittance property values represent initial conditions as determined by a laboratory accredited by the Cool Roof Rating Council.

Cool roofs are cost effective over air-conditioned spaces for buildings located in climate zones 1 - 5. In these locations, a minimum of 75% of the entire roof surface not used for roof penetrations shall be covered with roofing products that comply with one or more of the following:

- Have a minimum initial SRI of 78 for a low-sloped roof (a slope less than or equal to 2:12) and a minimum initial SRI of 29 for a steep-sloped roof (a slope of more than 2:12).
- Comply with the criteria for the US EPA's Energy Star Program Requirements for Roof Products – Eligibility Criteria.

For industrial buildings with only heating and ventilation, cool roofs can improve the comfort conditions (and hence productivity) in the space.

In order to be considered a cool roof, a solar reflectance of 0.67 when tested in accordance with ASTM C1549, ASTM E903, or ASTM E1918 and, in addition, a minimum thermal emittance of 0.75 when tested in accordance with ASTM C1371 or ASTM E408, or a minimum Solar Reflective Index of 78 when determined in accordance with the Solar Reflectance Index method in ASTM E1980 where standard white is SRI = 100 and standard black has SRI = 0. An SRI can be determined by the following equations:

$$SRI = 123.97 - 141.35(\alpha) + 9.655(\alpha^2)$$

Where

Where  $\alpha$  is the solar absorptance ( $= 1 - \text{solar reflectance}$ ) and  $\epsilon$  is the thermal emissivity, which were derived from ASTM E1980 assuming a medium wind speed.

The limited color choices available for cool roofs may not be acceptable to the installation. When this conflict cannot be resolved, the designer shall use the highest reflectance available in the roofing type/color acceptable to the installation.

#### Characteristics of reflective roofing materials.

Roofing Type	Color	New Solar Reflectance	Aged Solar Reflectance	New Thermal Emittance	SRI (ASTM E1980)
Roof Coatings	White	0.70 – 0.85	0.50 – 0.65	0.85	84 – 106
Roof Coatings	Grey or Tan	0.70	0.50	0.85	84
Roof Coatings	Terra Cotta or Brown	0.40	0.30	0.85	43
Roof Coatings	Aluminized	0.50	0.40	0.50	42
Metal Paint	Red	0.25	0.25	0.83	22
Metal Paint	Terra Cotta	0.35	0.35	0.83	36
Metal Paint	Bright Red	0.35	0.35	0.83	36
Metal Paint	Beige/Off White	0.55	0.55	0.83	63
Metal Paint	Tan	0.45	0.45	0.83	49
Metal Paint	Dark Blue	0.25	0.25	0.83	22
Metal Paint	Medium to Light Blue	0.32	0.32	0.83	32
Metal Paint	Dark Brown	0.25	0.25	0.83	22
Metal Paint	Medium to Light Brown	0.32	0.32	0.83	32
Metal Paint	Dark Green	0.25	0.25	0.83	22
Metal Paint	Medium to Light Green	0.32	0.32	0.83	32
Metal Paint	White	0.65	0.65	0.83	77
Metal Paint	Bright White	0.70	0.70	0.83	84
Metal Paint	Black	0.25	0.25	0.83	22
Metal Paint	Dark Grey	0.25	0.25	0.83	22
Metal Paint	Medium to Light Grey	0.35	0.35	0.83	36
Metal Paint	Pearlescent Colors	0.35	0.35	0.75	32
Galvalume	Unpainted	0.65	0.55	0.05	45

Roofing Type	Color	New Solar Reflectance	Aged Solar Reflectance	New Thermal Emittance	SRI (ASTM E1980)
Copper Metal	Unpainted	0.85	0.18	0.03	89
Galvanized Steel	Unpainted	0.40	0.20	0.50	26
EPDM Membrane	Black	0.05	0.10	0.85	0
TPO Membrane	White	0.80	0.60	0.85	99
TPO Membrane	Grey	0.50	0.40	0.85	57
PVC Membrane	White	0.80	0.60	0.85	99
PVC Membrane	Grey	0.50	0.40	0.85	57
Asphalt Shingle	Dark Color	0.10	0.10	0.85	4
Asphalt Shingle	Light Color	0.25	0.25	0.85	23
Modified Bitumen Cap Sheet	Dark Color	0.10	0.10	0.85	4
Modified Bitumen Cap Sheet	Light Color	0.25	0.25	0.85	23
Modified Bitumen Cap Sheet	White	0.50-0.60	0.40 – 0.45	0.85	57 - 71

4. **NR** means there is no requirement or recommendation for a component in this climate zone.
5. **Increased building air tightness.** Building air leakage (measured in cfm/ft<sup>2</sup>) is the average volume of air (measured in cubic feet per minute) that passes through a unit area of the building envelope (measured in square feet) when the building is maintained at a specified internal pressure (measured in Pascals). ASHRAE has proposed a building air tightness requirement of 0.4 cfm/ft<sup>2</sup> @ 75 Pa as an addendum to Standard 90.1. ASHRAE has also proposed an approach to complying with the new requirement with a pressurization test to show that the building leakage does not exceed 0.4 cfm/ft<sup>2</sup> at 75 Pa. This air tightness requirement provides a number that can be used for the energy simulations and was assumed to be the baseline leakage rate. The air tightness requirement adopted by the U.S. Army for new construction is more stringent than the one proposed by ASHRAE and requires that the leakage rate must not exceed 0.25 cfm/ft<sup>2</sup> at 75 Pa, and was assumed for the energy efficient building models. To convert the values used for building leakage tests at the pressure difference of 75Pa to the values which can be used to calculate required excessive outdoor air supply rates, the following equation can be used  $\Delta Q = Q_{75} * (5/75)^{0.65} = 0.172 * Q_{75}$ . The excessive airflow rate for the building complying with the new ASHRAE 90.1 Standard air leakage requirement is 0.069 cfm/ft<sup>2</sup>. Respective number for the building built to the Army model RFP requirement is 0.043 cfm/ft<sup>2</sup>.
6. Lighting Power Density:

Zone	Baseline		Efficient Model	
	W/ft <sup>2</sup>	W	W/ft <sup>2</sup>	W
Office1	1.00	4,947	0.90	4,452
Office2	1.00	4,947	0.90	4,452
Lockers	0.60	888	0.50	740
Utilities	1.50	2,219	1.00	1,479
Corridor	0.50	1,456	0.40	1,165
ReadiBay (x4)	0.90	4,787	0.70	3,723
Arms (x4)	1.40	765	1.10	601
Storage (x4)	0.90	1,325	0.70	1,031
		<b>41,967.5</b>		<b>33,710</b>

7. **Duct and pipe insulation**, values are from the ASHRAE Advanced Energy Design Guide for Small Offices.
8. **Energy Conservation Features Tables.** These tables are applicable to both the integrated and the detached Admin configurations of COFs.

9. **HVAC system.** The recommended PVAV system is for the Admin module. The Readiness building requires a separate HVAC unit for each company's module. High efficiency PSZ units may be used in these areas in lieu of PVAV units.

Schedule	Day of Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ALWAYS_ON	All	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ALWAYS_OFF	All	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BLDG_LIGHT	WD, SDD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.5	0.3	0.3	0.2	0.2	0.1	0.1
	Sat, Sun, WDD, Hol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
BLDG_EQUIP	WD, SDD	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.5	0.3	0.3	0.3	0.3	0.3	0.3
	WDD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sat, Sun, Hol	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
BLDG_OCC	WD	0	0	0	0	0	0	0	0.2	0.9	0.9	0.9	0.9	0.5	0.9	0.9	0.9	0.9	0.3	0	0	0	0	0	0
	SDD	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
	Sat, Sun, WDD, Hol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ReadiBay_OCC	WD	0	0	0	0	0	0	0	0	0.1	0.8	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
	SDD	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Sat, Sun, WDD, Hol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HVACOperation	WD, SDD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Sat, WDD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Sun, Hol	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ExhFan	WD, SDD, WDD	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
	Sat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sun, Hol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACTIVITY	All	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0	12 0
WORK_EFF	All	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AIR_VELO	All	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
CLOTHING	All	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	All	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	All	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
INFIL	WD, SDD	1	1	1	1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	1
	WDD	1	1	1	1	1	1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	1	1	1	1	1
	Sat, Sun, Hol	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PlantOn	All	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



Schedule	Day of Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
FAN	All	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
BLDG_HTGSET P	WD, WDD	13	13	13	13	13	13	22	22	22	22	22	22	22	22	22	22	22	22	22	13	13	13	13	13
	SDD	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Sat	13	13	13	13	13	13	22	22	22	22	22	22	22	13	13	13	13	13	13	13	13	13	13	13
	Sun, Hol	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
BLDG_CLGSET P	WD, SDD	32	32	32	32	32	32	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	32	32
	Sat	32	32	32	32	32	32	24	24	24	24	24	24	24	24	24	24	24	24	32	32	32	32	32	32
	WDD	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
	Sun, Hol	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
ReadiBay_HTGS ETP	WD, WDD	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	SDD	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Sat	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Sun, Hol	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
ReadiBay_CLGS ETP	WD, SDD	32	32	32	32	32	32	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	32	32
	Sat	32	32	32	32	32	32	28	28	28	28	28	28	28	28	28	28	28	28	32	32	32	32	32	32
	WDD	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
	Sun, Hol	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Humidity Setpoint	WD, SDD	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
	Sat, WDD	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
	Sun, Hol	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
MinOA	All	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dual Zone Control Type	All	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
BLDG_SHW	WD, SDD	0	0	0	0	0	0	0	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0	0	0	0	0	0
	Sat, WDD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sun, Hol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHW Latent fract	All	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHW Sensible fract	All	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
SHW Temp	All	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
SHW Supply Temp	All	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
Lockers sub cat Latent fract	All	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Schedule	Day of Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Lockers sub cat Sensible fract	All	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lockers sub cat Temp	All	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Lockers sub catHot Supply Temp	All	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
SHWSys1-Loop- Temp	All	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHWSys1 Water Heater Setpoint	All	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
SHWSys1 Water Heater Ambient	All	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22

### 3.3.9. Furniture Systems

The following criterion describes the furnishing requirements for all room types. Furnishings, other than installed equipment, are to be Government-furnished and Government-installed (GFGI) unless otherwise specified in this document. The following furnishings list is provided for coordination of room and office layouts to ensure suitability for their intended function.

**Table 1: Room Size and Furnishing Chart**

Room	Description	NSF	Comments	Furniture Required
CO	Commander	150	PRIVATE OFFICE	U-shaped executive desk with two pedestals, dbl pedestal credenza, hutch, two 4-drawer lateral files, one conference table, four conference chairs, one executive chair.
XO	Executive Officer	150	PRIVATE OFFICE	L-shaped double pedestal desk unit, hutch, two 4-drawer lateral files, two guest chairs, one task chair.
1SG	1 <sup>st</sup> Sergeant	150	PRIVATE OFFICE	L-shaped double pedestal desk unit, double pedestal credenza, hutch, two 4-drawer lateral files, four guest chairs, one executive chair.
TRAINING	Training Room	150	PRIVATE OFFICE	L-shaped double pedestal desk unit, hutch, two 4-drawer lateral files, two guest chairs, one task chair.
PLATOON	Platoon Offices	150x4	SEMI-PRIVATE OFFICES	For each 150 SF office, 2 desks to accommodate computers, 2 task chairs, 2 bookcases for manuals, two 4-drawer file cabinets.
CONF. ROOM	Conference Room	Varies	CONFERENCE ROOM	Conference Table with 10 chairs and 6 side chairs.
ARMS VAULT	Arms Vault	Varies	CONSTRUCTED IN ACCORDANCE WITH AR 190-11, APP G.	1 desk to accommodate a computer, 1 task chair, 1 bookcase for manuals, one 4-drawer file cabinet, and 1 work bench.
UNIT STOR.	Unit Storage	Varies	STORAGE ROOM	1 desk unit consisting of: single pedestal metal desk w/ box, box, file pedestal; 1 ergonomic task chair, 1 three shelf bookcase for manuals, 4 lockable metal cabinets with shelves, two 4-drawer lateral file cabinets, industrial shelving approximately 5'wx4'dx6'h each - 2 for 1 <sup>st</sup> 100PN, 1 additional for every 100PN thereafter.
COMM. STOR.	Communications Storage	Varies	STORAGE ROOM	1 desk unit consisting of: single pedestal metal desk w/ box, box, file pedestal; 1 ergonomic task chair, 1 three shelf bookcase for manuals, 4 lockable metal cabinets with shelves, two 4-drawer lateral file cabinets, industrial shelving approximately 5'wx4'dx6'h each - 2 for 1 <sup>st</sup> 100PN, 1 additional for every 100PN thereafter.
NBC STOR.	NBC Storage	Varies	STORAGE ROOM	1 desk unit consisting of: single pedestal metal desk w/ box, box, file pedestal; 1 ergonomic task chair, one 4-drawer lateral file; and 4 lockable metal cabinets with shelves.
SECURE STOR.	Secure Storage	Varies	STORAGE ROOM	4 lockable metal cabinet with shelves and industrial shelving approximately 5'wx4'dx6'h each - 2 for 1st 100PN, 1 additional for every 50PN thereafter.

### 3.3.10. References

- (1) Army Regulation 190-11 Physical Security of Arms, Ammunition and Explosives

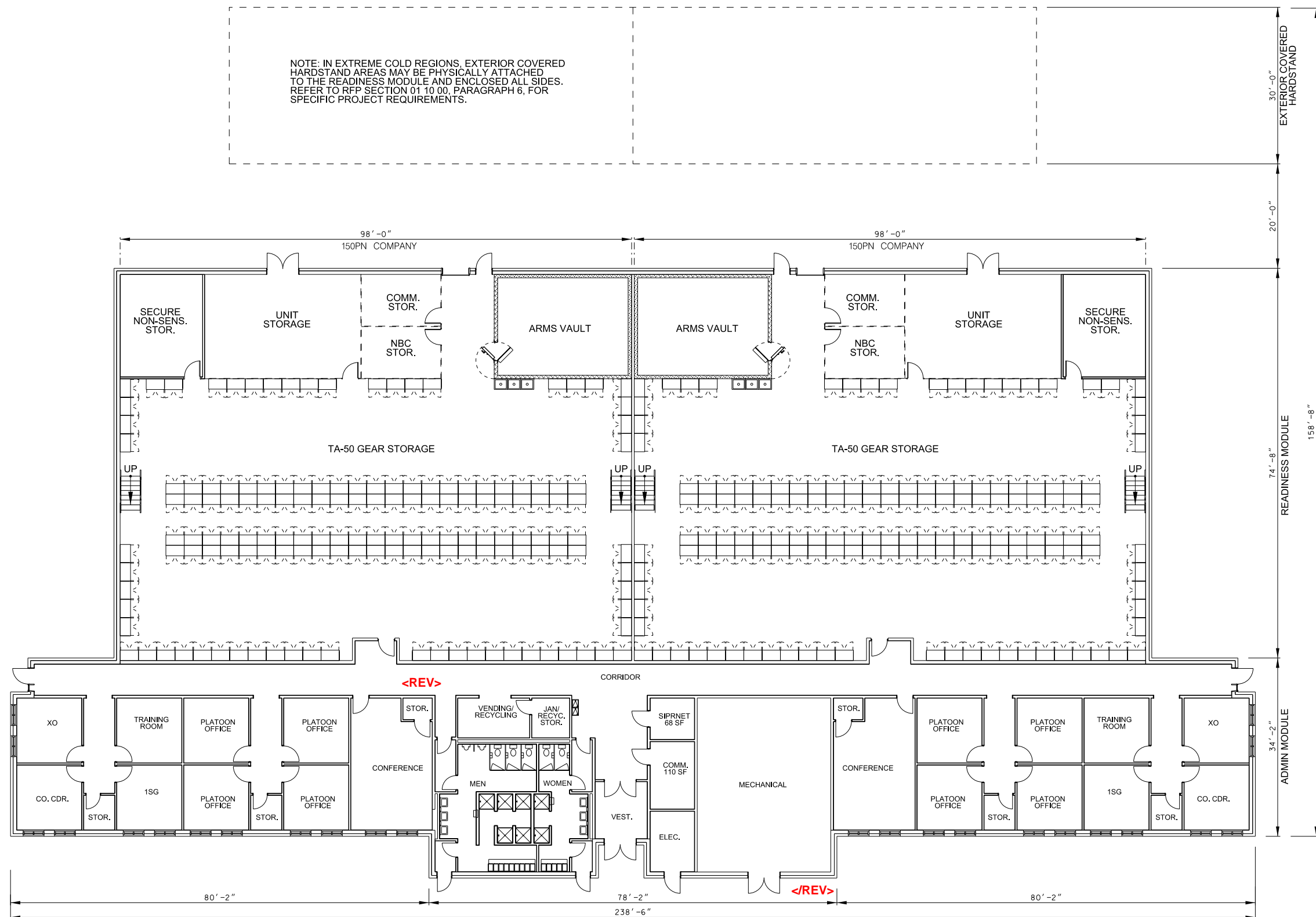
- (2) Army Regulation 190–13 The Army Physical Security Program
- (3) Army Regulation 190-51, Security of Unclassified Army Property (Sensitive and Nonsensitive)
- (4) Army Regulation 380–5 Information Security Program
- (5) Army Regulation 380–19 Information Systems Security
- (6) Fed Spec AA-V-2737, Modular Vault Systems
- (7) Uniform Federal Accessibility Standards (UFAS)

### 3.4. PROGRAM REQUIREMENTS

The following table (COF Table 2) provides the space allocations for the various standard modules for COFs:

**Table 2: Space Criteria for Company Operations Facilities**

<b>ADMIN MODULE MINIMUM REQUIRED NET AREAS (REQUIRED PER SPACE)</b>				
	<b>ADMIN (TYPICAL)</b>			
<b><u>ADMIN MODULE</u></b>				
<b>Office Areas</b>				
Command/Platoon Storage	40			
XO	150			
1SG	150			
CO	150			
Training Room	150			
Conference Room	310			
Platoon Offices	150			
<b>READINESS MODULE VARIANTS - MINIMUM REQUIRED NET AREAS (BASED ON PERSONNEL PER COMPANY)</b>	<b>100 PN</b>	<b>150 PN</b>	<b>200 PN</b>	<b>ADD'L 50 PN</b>
<b><u>READINESS MODULE</u></b>				
<b>Supply Bay</b>				
Secure Storage for Non-Sensitive Items	166	306	504	169
Vault	400	500	600	100
NBC Storage	94	152	198	52
Communications Storage	94	152	198	52
Unit Storage	367	595	764	199
<b>Readiness Bay</b>				
TA-50 Lockers/Equipment Layout Area	3,672	5,292	6,912	1,620
<b>Overflow / Expansion Space</b>	1,290	1,833	2,383	547
<b><u>EXTERIOR COVERED HARDSTAND</u></b>				
Equipment Maintenance/Layout Space/Weapons Cleaning	1,671	2,328	2,985	657

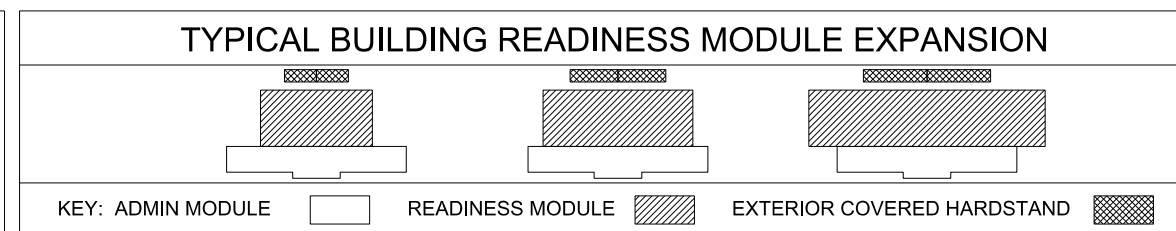


## FIRST FLOOR PLAN

BUILDING AREAS:	SF SHOWN	MAX. ALLOWABLE GROSS AREA
ADMIN MODULE:	8,405.00 GSF	8,412.00 GSF
READINESS MODULE:	18,678.00 GSF	VARIES
EXTERIOR COVERED HARDSTAND:	4,640.00 GSF	VARIES
TOTAL:	31,723.00 GSF	* VARIES

FLOOR PLAN INDICATES THE ARMY STANDARD IN SCHEMATIC FORM. THE DESIGNER-OF-RECORD IS ALLOWED TO MAKE ADJUSTMENTS FOR EXTERIOR FACADE/ARCHITECTURAL THEME, AND/OR TO ACCOMMODATE SPECIFIC BUILDING ENGINEERING SYSTEMS (STRUCTURAL, MECHANICAL, ELECTRICAL, LEED, FIRE PROTECTION, ETC.). THESE ADJUSTMENTS WILL BE EVALUATED BY THE CENTER OF STANDARDIZATION (C0S) DURING ITS COMPLIANCE REVIEW. INNOVATIVE, COST SAVING SOLUTIONS WILL BE GIVEN PROPER CONSIDERATION BY THE COS, AND WILL BE ADOPTED AS APPROPRIATE.

AREAS SHOWN ON THE FLOOR PLAN ARE TO BE CONSIDERED NET PROGRAM REQUIREMENTS. THE MAXIMUM ALLOWABLE GROSS BUILDING AREA IS THE MAXIMUM GROSS SPACE PERMISSIBLE FOR THE FACILITY. A REDUCED OVERALL GROSS AREA IS ACCEPTABLE IF ALL NET PROGRAM REQUIREMENTS AND ADJACENCIES ARE MET.

[illegible]

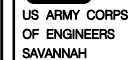
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS SAVANNAH DISTRICT	DESIGNED BY:		DATE:	
	DWN BY:	CHK BY:	SOLICITATION NO.:	
	SUBMITTED BY:		CONTRACT NO.:	
	FILE NAME:		CATEGORY CODE:	
	SHEET D	PLOT SCALE:		PLOT DATE:
	22X34"			

PROJECT NAME	2 COMPANY OPTION
PROJECT LOCATION	W/ INTERGRATED ADMIN

PLATE  
REFERENCE  
NUMBER

SHEET



[illegible]

U. S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS SAVANNAH DISTRICT	DESIGNED BY:		DATE:	
	DRAWN BY:	CKD BY:	SOLUTIONATION NO.:	
	SUBMITTED BY:		CONTRACT NO.:	
	FILE NAME:		CATEGORY CODE:	
	SHEET D 2222244	PLOT SCALE:	PLOT DATE:	

PROJECT NAME	PROJECT LOCATION
READINESS MODULE	SIZING TEMPLATES

PLATE REFERENCE NUMBER	
------------------------------	--

Friday, April 29, 2017

```
$$$DGNSPEC$$$
$$$SYSTIME$$$
$$$USERNAME$$$
```



AREAS SHOWN ON THE FLOOR PLAN ARE TO BE CONSIDERED NET PROGRAM REQUIREMENTS. THE MAXIMUM ALLOWABLE GROSS BUILDING AREA IS THE MAXIMUM GROSS SPACE PERMISSIBLE FOR THE FACILITY. A REDUCED OVERALL GROSS AREA IS ACCEPTABLE IF ALL NET PROGRAM REQUIREMENTS AND ADJACENCIES ARE MET.

**2. LARGER CONFIGURATIONS, BASED ON INCREMENTS OF 50 PERSONS, ARE POSSIBLE. EACH 50 PERSON INCREMENTAL INCREASE WILL ADD APPROXIMATELY 30 FEET IN LENGTH TO THE READINESS MODULE. SEE RFP SECTION 01 10 00.**

## 250 PERSON READINESS MODULE

## 200 PERSON READINESS MODULE

The floor plan shows a rectangular room with a dashed line indicating a mezzanine level. The mezzanine is labeled "OVERFLOW / EXPANSION MEZZANINE ABOVE". Below the mezzanine, there are two rows of storage units. To the left of the units, there is a staircase labeled "UP". To the right, there is a staircase labeled "UP" and a vertical dimension line indicating a height of 54'-0".

The main floor contains several storage areas:

- TA-50 GEAR STORAGE**: A large rectangular area in the center.
- SECURE NON-SENS. STOR.**: A rectangular area on the left side.
- UNIT STORAGE**: A large rectangular area in the center, adjacent to the TA-50 GEAR STORAGE.
- NBC STOR.**: A rectangular area on the right side, adjacent to the UNIT STORAGE.
- COMM. STOR.**: A rectangular area below the NBC STOR.
- ARMS VAULT**: A rectangular area on the right side, adjacent to the COMM. STOR.

A horizontal dimension line at the bottom indicates a width of 128'-0".

The floor plan shows a rectangular layout with a dashed line indicating a boundary. The top section is labeled "OVERFLOW / EXPANSION MEZZANINE ABOVE". Below this, there are two rows of storage units, each with a "UP" arrow pointing to the mezzanine. The bottom section is labeled "TA-50 GEAR STORAGE" and contains several specific storage areas: "SECURE NON-SENS. STOR.", "UNIT STORAGE", "NBC STOR.", "COMM. STOR.", and "ARMS VAULT". The "ARMS VAULT" is a large, thick-walled room with a door and a small window. The overall dimensions are 158'-0" by 54'-0".

OVERFLOW / EXPANSION  
MEZZANINE ABOVE

UP

TA-50 GEAR STORAGE

SECURE  
NON-SENS.  
STOR.

UNIT  
STORAGE

NBC  
STOR.

COMM.  
STOR.

ARMS VAULT

UP

158'-0"

54'-0"

SUPPLY RAY AREA

EQUIPMENT VAULT AND TA-50 GEAR STORAGE

**C**

A

\$SDGNSPEC\$\$  
\$SSYSTIME\$\$  
\$SUSERNAME\$\$

#### 4.0 APPLICABLE CRITERIA

Unless a specific document version or date is indicated, use criteria from the most current references, including any applicable addenda, unless otherwise stated in the contract or task order, as of the date of the Contractor's latest accepted proposal or date of issue of the contract or task order solicitation, whichever is later. In the event of conflict between References and/or Applicable Military Criteria, apply the most stringent requirement, unless otherwise specifically noted in the contract or task order.

##### 4.1. INDUSTRY CRITERIA

Applicable design and construction criteria references are listed in Table 1 below. This list is not intended to include all criteria that may apply or to restrict design and construction to only those references listed. See also Paragraph 3 for additional facility-specific applicable criteria.

**Table 1: Industry Criteria**

<b>Air Conditioning and Refrigeration Institute (ARI)</b>	
ARI 310/380	Packaged Terminal Air-Conditioners and Heat Pumps
ARI 440	Room Fan-Coil and Unit Ventilator
ANSI/ARI 430-99	Central Station Air Handling Units
ARI 445	Room Air-Induction Units
ARI 880	Air Terminals
<b>Air Movement and Control Association (AMCA)</b>	
AMCA 210	Laboratory Methods of Testing Fans for Rating
<b>American Architectural Manufacturers Association (AAMA)</b>	
AAMA 605	Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
AAMA 607.1	Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
AAMA 1503	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
<b>American Association of State Highway and Transportation Officials (AASHTO)</b>	
	Roadside Design Guide [guardrails, roadside safety devices]



	Standard Specifications for Transportation Materials and Methods of Sampling and Testing [Road Construction Materials]
	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals
	Guide for Design of Pavement Structures, Volumes 1 and 2 [pavement design guide]
	A Policy of Geometric Design of Highways and Streets
<b>American Bearing Manufacturers Association (AFBMA)</b>	
AFBMA Std. 9	Load Ratings and Fatigue Life for Ball Bearings
AFBMA Std. 11	Load Ratings and Fatigue Life for Roller Bearings
<b>American Boiler Manufacturers Association (ABMA)</b>	
ABMA ISEI	Industry Standards and Engineering Information
<b>American Concrete Institute</b>	
ACI 302.2R	Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
ACI 318	Building Code Requirements for Structural Concrete
ACI SP-66	ACI Detailing Manual
ACI 530	Building Code Requirements for Masonry Structures
<b>ADA Standards for Accessible Design</b>	
See US Access Board	ADA and ABA Accessibility Guidelines for Buildings and Facilities, Chapters 3-10.
<b>American Institute of Steel Construction (AISC)</b>	
	Manual of Steel Construction – 13 <sup>th</sup> Edition (or latest version)
<b>American Iron and Steel Institute</b>	
AISI S100	North American Specification for the Design of Cold-Formed Steel Structural Members

<b>American National Standards Institute 11 (ANSI)</b>	
ANSI Z21.10.1	Gas Water Heaters Vol. 1, Storage water Heaters with Input Ratings of 75,000 Btu per Hour or less
ANSI Z124.3	American National Standard for Plastic Lavatories
ANSI Z124.6	Plastic Sinks
ANSI Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
ANSI/IEEE C2-2007	National Electrical Safety Code
ANSI/AF&PA NDS-2001	National Design Specification for Wood Construction
<b>American Society of Civil Engineers (ASCE)</b>	
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASCE 37	Design and Construction of Sanitary and Storm Sewers, Manuals and Reports on Engineering Practice [sanitary sewer and storm drain design criteria]
ASCE/SEI 31-03	Seismic Evaluation of Existing Buildings [Existing Building Alteration/Renovation]
ASCE/SEI 41-06	Seismic Rehabilitation of Existing Buildings [Existing Building Alteration/Renovation]
<b>American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)</b>	
ASHRAE 90.1	ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE Guideline 0	The Commissioning Process
ASHRAE Guideline 1.1	The HVAC Commissioning Process
ASHRAE Handbooks	Fundamentals, HVAC Applications, Systems and Equipment, Refrigeration (Applicable, except as otherwise specified)
ASHRAE Standard 15	Safety Standard for Refrigeration Systems
ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality

ASHRAE Standard 55	Thermal Environmental Conditions for Human Occupancy (Design portion is applicable, except where precluded by other project requirements.)
<b>American Society of Mechanical Engineers International (ASME)</b>	
ASME BPVC SEC VII	Boiler and Pressure Vessel Code: Section VII Recommended Guidelines for the Care of Power Boilers
ASME A17.1	Safety Code for Elevators and Escalators
ASME B 31 (Series)	Piping Codes
<b>American Water Works Association (AWWA)</b>	
	Standards [standards for water line materials and construction]
<b>American Welding Society</b>	
	Welding Handbook
	Welding Codes and Specifications (as applicable to application, see International Building Code for example)
<b>Architectural Woodwork Institute (AWI)</b>	
Latest Version	AWI Quality Standards
<b>Associated Air Balance Council (AABC)</b>	
AABC MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems
	AABC Associated Air Balance Council Testing and Balance Procedures
<b>ASTM International</b>	
ASTM C1060-90(1997)	Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
ASTM E 779 (2003)	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1827-96(2002)	Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door

<b>Builders Hardware Manufacturers Association (BHMA)</b>	
ANSI/BHMA	The Various BHMA American National Standards
<b>Building Industry Consulting Service International</b>	
	Telecommunications Distribution Methods Manual (TDMM)
	Customer-Owned Outside Plant Design Manual (CO-OSP)
<b>Code of Federal Regulations (CFR)</b>	
49 CFR 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
10 CFR 430	Energy Conservation Program for Consumer Products
<b>Consumer Electronics Association</b>	
CEA 709.1B	Control Network Protocol Specification
CEA 709.3	Free-Topology Twisted-Pair Channel Specification
CEA 852	Tunneling Component Network Protocols Over Internet Protocol Channels
<b>Electronic Industries Association (EIA)</b>	
ANSI/EIA/TIA 568	Structured Cabling Series
ANSI/EIA/TIA 569	Commercial Building Standard for Telecommunications Pathways and Spaces (includes ADDENDA)
ANSI/TIA/EIA-606	Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
J-STD EIA/TIA 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
<b>Federal Highway Administration (FHWA)</b>	
	Manual on Uniform Traffic Control Devices for Streets and Highways [signage and pavement markings for streets and highways]
FHWA-NHI-01-021	Hydraulic Engineering Circular No. 22, Second Edition, URBAN DRAINAGE DESIGN MANUAL

<b>Illuminating Engineering Society of North America (IESNA)</b>	
IESNA RP-1	Office Lighting
IESNA RP-8	Roadway Lighting
IESNA Lighting Handbook	Reference and Application
<b>Institute of Electrical and Electronics Engineers Inc. (IEEE)</b>	
	Standard for Use of the International System of Units (SI): the Modern Metric System
Standard 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
<b>International Code Council (ICC)</b>	
IBC	<p>International Building Code</p> <p>Note: All references in the International Building Code to the International Electrical Code shall be considered to be references to NFPA 70.</p> <p>All references in the International Building Code to the International Fuel Gas Code shall be considered to be references to NFPA 54 and NFPA 58.</p> <p>All references in the International Building Code to the International Fire Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.</p>
IMC	<p>International Mechanical Code –</p> <p>Note: For all references to “HEATING AND COOLING LOAD CALCULATIONS”, follow ASHRAE 90.1</p> <p>Note: For all references to “VENTILATION”, follow ASHRAE 62.1</p>
IRC	International Residential Code
IPC	International Plumbing Code
IEC	Energy Conservation Code (IEC) –Applicable only to the extent specifically referenced herein. Refer to Paragraph 5, ENERGY CONSERVATION requirements.
IGC	International Gas Code - not applicable. Follow NFPA 54, National Fuel Gas Code and NFPA 58, Liquefied Petroleum Gas Code.

<b>International Organization for Standardization (ISO)</b>	
ISO 6781:1983	Qualitative detection of thermal irregularities in building envelopes – infrared method
<b>LonMark International (LonMark)</b>	
LonMark Interoperability Guidelines	(available at <a href="http://www.lonmark.org">www.lonmark.org</a> ), including: Application Layer Guidelines, Layer 1-6 Guidelines, and External Interface File (XIF) Reference Guide
LonMark Resource Files	(available at <a href="http://www.lonmark.org">www.lonmark.org</a> ), including Standard Network Variable Type (SNVT) definitions
<b>Metal Building Manufacturers Association (MBMA)</b>	
	Metal Building Systems Manual
<b>Midwest Insulation Contractors Association (MICA)</b>	
	National Commercial and Industrial Insulation Standards Manual
<b>National Association of Corrosion Engineers International (NACE)</b>	
NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0185	Extruded, Polyolefin Resin Coating Systems with Adhesives for Underground or Submerged Pipe
NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection
NACE RP0286	Electrical Isolation of Cathodically Protected Pipelines
<b>National Electrical Manufacturers Association (NEMA)</b>	
<b>National Environmental Balancing Bureau (NEBB)</b>	
	Procedural Standards Procedural Standards for Testing Adjusting Balancing of Environmental Systems
<b>National Fire Protection Association (NFPA)</b>	
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 13	Installation of Sprinkler Systems

NFPA 13R	Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems
NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 20	Installation of Centrifugal Fire Pumps
NFPA 24 NFPA 25	Standard for the Installation of Private Fire Service Mains and Their Appurtenances [underground fire protection system design]  Inspection, Testing And Maintenance Of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 30A	Motor Fuel Dispensing Facilities and Repair Garages
NFPA 31	Installation of Oil Burning Equipment
NFPA 54	National Fuel Gas Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 76	Fire Protection of Telecommunications Facilities
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 90a	Installation of Air Conditioning and Ventilating Systems
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
<b>National Roofing Contractor's Association (NRCA)</b>	
	Roofing and Waterproofing Manual
<b>National Sanitation Foundation, International</b>	

NSF/ANSI Std. 2, 3, 4, 5, 6, 7, 8, 12, 13, 18, 20, 21, 25, 29, 35, 36, 37, 51, 52, 59, 169	Food Equipment Standards
ANSI/UL Std. 73, 197, 471, 621, 763	Food Equipment Standards
CSA Std. C22.2 No. 109, 120, 195	Food Equipment Standards
<b>Occupational Safety and Health Administration (OSHA)</b>	
Title 29, Part 1926	OSHA Construction Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction
<b>Plumbing and Drainage Institute (PDI)</b>	
PDI G 101	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data
PDI WH201	Water Hammer Arrestors
<b>Precast Concrete Institute</b>	
PCI Design Handbook	Precast and Prestressed Concrete
<b>Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)</b>	
SMACNA HVAC Duct Construction Standards	HVAC Duct Construction Standards - Metal and Flexible
SMACNA Architectural Manual	Architectural Sheet Metal Manual
SMACNA HVAC TAB	HVAC Systems - Testing, Adjusting and Balancing
<b>State/Local Regulations</b>	
	State Department of Transportation Standard Specifications for Highway and Bridge Construction
	Sedimentation and Erosion Control Design Requirements
	Environmental Control Requirements
	Storm Water Management Requirements



<b>Steel Door Institute (SDI)</b>	
ANSI A250.8/SDI 100	Standard Steel Doors and Frames
<b>Steel Deck Institute</b>	
	SDI Diaphragm Design Manual
<b>Steel Joist Institute</b>	
	Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders
<b>Underwriters Laboratories (UL)</b>	
UL 96A	Installation Requirements for Lightning Protection Systems
UL 300	Standard for Safety for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas
<b>UNITED STATES ACCESS BOARD: U.S. ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD</b>	
ADA and ABA Accessibility Guidelines for Buildings and Facilities	<p>ABA Accessibility Standard for DoD Facilities</p> <p>Derived from the ADA and ABA Accessibility Guidelines: Specifically includes: ABA Chapters 1 and 2 and Chapters 3 through 10.</p> <p>Use this reference in lieu of IBC Chapter 11.</p> <p>Excluded are:</p> <p>(a) Facilities, or portions of facilities, on a military installation that are designed and constructed for use exclusively by able-bodied military personnel (See Paragraph 3 for any reference to this exclusion).</p> <p>(b) Reserve and National Guard facilities, or portions of such facilities, owned by or under the control of the Department of Defense, that are designed and constructed for use exclusively by able-bodied military personnel. (See paragraph 3 for any reference to this exclusion).</p>
<b>U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES</b>	
	FDA National Food Code
<b>U.S. GREEN BUILDING COUNCIL (USGBC)</b>	
LEED-NC	Green Building Rating System for New Construction & Major Renovations
	Application Guide for Multiple Buildings and On-Campus Building

	Projects
--	----------

#### 4.2. MILITARY CRITERIA

The project shall conform to the following criteria. Certain design impacts and features due to these criteria are noted for the benefit of the offeror. However, all requirements of the referenced criteria will be applicable, whether noted or not, unless otherwise specified herein.

4.2.1. Energy Policy Act of 2005 (Public Law 109-58) (applies only to the extent specifically implemented in the contract, which may or may not directly cite or reference EPACT)

4.2.2. Executive Order 12770: Metric Usage In Federal Government

(a) Metric design and construction is required except when it increases construction cost. Offeror to determine most cost efficient system of measurement to be used for the project.

4.2.3. TB MED 530: Occupational and Environmental Health Food Sanitation

4.2.4. Unified Facilities Criteria (UFC) 3-410-01FA: Heating, Ventilating, and Air Conditioning - applicable only to the extent specified in paragraph 5, herein.

4.2.5. Deleted.

4.2.6. UFC 3-600-01 Design: Fire Protection Engineering for Facilities. Use the latest edition of the IBC in coordination with this UFC. Use Chapters 3, 6, 7, 33 and UFC 3-600-01. If any conflict occurs between these Chapters and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence. Use UFC 3-600-01 in lieu of IBC Chapters 4, 8,9,10.

4.2.7. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings

4.2.8. UFC 4-023-03 Design of Buildings to Resist Progressive Collapse (Use most recent version, regardless of references thereto in other publications)

(a) Note the option to use tie force method or alternate path design for Occupancy Category II.

4.2.9. UFC 4-021-01 Design and O&M: Mass Notification Systems

4.2.10. Technical Criteria for Installation Information Infrastructure Architecture (I3A)

(a) Email: [DetrickISECI3Aguide@conus.army.mil](mailto:DetrickISECI3Aguide@conus.army.mil)

4.2.11. U.S. Army Information Systems Engineering Command (USAISEC) TG for the Integration of SECRET Internet Protocol (IP) Router Network (SIPRNET). See Paragraph 3 for applicability to specific facility type. May not apply to every facility. This is mandatory criteria for those facilities with SIPRNET.

4.2.11.1. Draft Guide Specification for Section 27 05 28 PROTECTIVE DISTRIBUTION SYSTEM (PDS) FOR SIPRNET COMMUNICATIONS SYSTEMS, found at [https://rfpwizard.cecer.army.mil/HTML/docs/Refs/SECTION\\_270528-v3.pdf](https://rfpwizard.cecer.army.mil/HTML/docs/Refs/SECTION_270528-v3.pdf)

## 5.0 GENERAL TECHNICAL REQUIREMENTS

This paragraph contains technical requirements with general applicability to Army facilities. See also Paragraph 3 for facility type-specific operational, functional and technical requirements. Residential or similar grade finishes and materials are not acceptable for inclusion in these buildings, unless otherwise specifically allowed.

### 5.1. SITE PLANNING AND DESIGN

5.1.1. STANDARDS AND CODES: The site planning and design shall conform to APPLICABLE CRITERIA and to paragraph 6, PROJECT SPECIFIC REQUIREMENTS.

5.1.2. SITE PLANNING OBJECTIVES: Group buildings in configurations that create a sense of community and promote pedestrian use. See paragraph 3 for additional site planning requirements relating to building functions.

5.1.2.1. Provide enclosures and or visual screening devices for Outdoor Utility such as dumpsters, emergency generators, transformers, heating, ventilation, and air conditioning units from streetscape and courtyard views to limit visual impact. Enclosures shall be compatible with the building they serve and accessible by vehicle. The location of dumpsters can have a significant visual impact and should be addressed as part of an overall building design and incorporated in site planning.

5.1.2.2. Where included in the project, dumpster pads shall be concrete (minimum of 8 inches thick on 4 inch base course, unless site conditions dictate more conservative requirements) and directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Provide space at dumpster areas for recycling receptacles. Coordinate with Installation on recycling receptacle types, sizes and access requirements and provide space at dumpster areas to accommodate them.

5.1.2.3. Vehicular Circulation. Apply design vehicle templates provided by the American Association of State Highway and Transportation Officials (AASHTO) to the site design. The passenger car class includes passenger cars and light trucks, such as vans and pick-ups. The passenger car template is equivalent to the non-organizational – privately owned vehicle (POV). The truck class template includes single-unit trucks, recreation vehicles, buses, truck tractor-semi-trailer combinations, and trucks or truck tractors with semi-trailers in combination with full trailers. Provide vehicle clearances required to meet traffic safety for emergency vehicles, service vehicles, and moving vans. Provide required traffic control signage Site entrances and site drive aisles shall maximize spacing between drives, incorporate right-angle turns, and limit points of conflict between traffic. Design Services Drives to restrict access to unauthorized vehicles by removable bollards, gates, or other barriers to meet Anti-Terrorism/Force Protection (ATFP) requirements. Orient service drives to building entrances other than the primary pedestrian entry at the front of the building.

5.1.2.4. Provide Emergency Vehicle Access around the facility and shall be in accordance with AT/FP requirements. Maintain a 33-foot clear zone buffer for emergency vehicles, designed to prevent other vehicles from entering the AT/FP standoff to the building.

5.1.2.5. Clear and grub all trees and vegetation necessary for construction; but, save as many trees as possible. Protect trees to be saved during the construction process from equipment.

5.1.2.6. Stormwater Management. Employ design and construction strategies (Best Management Practices) that reduce stormwater runoff, reduce discharges of polluted water offsite and maintain or restore predevelopment hydrology with respect to temperature, rate, volume and duration of flow to the maximum extent practicable. See paragraph 6, PROJECT SPECIFIC requirements for additional information.

5.1.3. EXTERIOR SIGNAGE: Provide exterior signage in accordance with Appendix H, Exterior Signage. Provide exterior NO SMOKING signage that conveys building and grounds smoking policy.

5.1.4. EXISTING UTILITIES: Base utilities maps and capacities for this site are included as part of this RFP. See paragraph 6 for more detailed information.

### 5.2. SITE ENGINEERING

5.2.1. STANDARDS AND CODES: The site engineering shall conform to APPLICABLE CRITERIA.

5.2.2. SOILS:

5.2.2.1. A report has been prepared to characterize the subsurface conditions at the project site and is **appended to these specifications**. The report provides a general overview of the soil and geologic conditions with detailed descriptions at discrete boring locations. The Contractor's team shall include a licensed geotechnical engineer to interpret the report and develop earthwork and foundation recommendations and design parameters in which to base the contractor's design. If any additional subsurface investigation or laboratory analysis is required to better characterize the site or develop the final design, the Contractor shall perform it under the direction of a licensed geotechnical engineer. There will be no separate payment for the cost of additional tests. If differences between the Contractor's additional subsurface investigation and the government provided soils report or the reasonably expected conditions require material revisions in the design, an equitable adjustment may be made, in accordance with the provisions of the Differing Site Conditions clause. The basis for the adjustment would be the design and construction appropriate for the conditions described in the Government furnished report or the reasonably expected conditions, in comparison with any changes required by material differences in the actual conditions encountered, in accordance with the terms of contract clause Differing Site Conditions.

5.2.2.2. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal, as described in Section 01 33 16, *Design After Award*.

5.2.3. VEHICLE PAVEMENTS: (as applicable to the project)

5.2.3.1. Design procedures and materials shall conform to one of the following: 1) the USACE Pavement Transportation Computer Assisted Structural Engineering (PCASE) program, 2) American Association of State Highway and Transportation Officials (AASHTO) or, 3) the applicable state Department of Transportation standards in which the project is located. See paragraph 5.2.2.2 and Section 01 33 16 for required information for the Contractor's geotechnical evaluation report. The minimum flexible pavement section shall consist of 2 inches of asphalt and 6 inches of base or as required by the pavement design, whichever is greater, unless specifically identified by the Government to be a gravel road. Design roads and parking areas for a life expectancy of 25 years with normal maintenance. Parking area for tactical vehicles (as applicable to the project) shall be Portland Cement Concrete (PCC) rigid pavement design. For concrete pavements, submit joint layout plan for review and concurrence. Design pavements for military tracked vehicles (as applicable to the project) IAW USACE PCASE. Traffic estimates for each roadway area will be as shown on the drawings or listed in Section 01 10 00 Paragraph 6.4.4. Pavement markings and traffic signage shall comply with the Installation requirements and with the Manual on Uniform Traffic Control Devices.

5.2.3.2. Parking Requirements.

(a) All handicap POV parking lots (where applicable in the facility specific requirements) shall meet the ADA and ABA Accessibility Guidelines for accessible parking spaces.

(b) Design POV parking spaces for the type of vehicles anticipated, but shall be a minimum of 9 ft by 18 ft for POVs, except for two wheel vehicles.

5.2.3.3. Sidewalks. Design the network of walks throughout the complex (where applicable) to facilitate pedestrian traffic among facilities, and minimize the need to use vehicles. Incorporate sidewalks to enhance the appearance of the site development, while creating a sense of entry at the primary patron entrances to the buildings. Minimum sidewalk requirements are in Paragraph 3, where applicable and/or paragraph 6 and/or site plans, where applicable..

5.2.4. CATHODIC PROTECTION: Provide cathodic protection systems for all underground metallic systems and metallic fittings/portions of non-metallic, underground systems, both inside and outside the building 5 foot line that are subject to corrosion. Coordinate final solutions with the installation to insure an approach that is consistent with installation cathodic protection programs.

5.2.5. UTILITIES: See paragraph 6.4.6 for specific information on ownership of utilities and utility requirements. Meter all utilities (gas, water, and electric, as applicable) to each facility. For Government owned utilities, install meters that are wireless data transmission capable as well as have a continuous manual reading option. All meters will be capable of at least hourly data logging and transmission and provide consumption data for gas, water, and

electricity. Gas and electric meters will also provide demand readings based on consumption over a maximum of any 15 minute period. Configure all meters to transmit at least daily even if no receiver for the data is currently available at the time of project acceptance. For privatized utilities, coordinate with the privatization utility(ies) for the proper meter base and meter installation.

5.2.6. PERMITS: The CONTRACTOR shall be responsible for obtaining all permits (local, state and federal) required for design and construction of all site features and utilities.

5.2.7. IRRIGATION. Landscape irrigation systems, if provided, shall comply with the following:

5.2.7.1. Irrigation Potable Water Use Reduction. Reduce irrigation potable water use by 100 percent using LEED credit WE1.1 baseline (no potable water used for irrigation), except where precluded by other project requirements.

5.2.8. EPA WATERSENSE PRODUCTS AND CONTRACTORS. Except where precluded by other project requirements, use EPA WaterSense labeled products and irrigation contractors that are certified through a WaterSense labeled program where available.

### 5.3. ARCHITECTURE AND INTERIOR DESIGN:

This element will be evaluated per APPLICABLE CRITERIA under the quality focus.

5.3.1. STANDARDS AND CODES: The architecture and interior design shall conform to APPLICABLE CRITERIA.

5.3.2. GENERAL: Overall architectural goal is to provide a functional, quality, visually appealing facility that is a source of pride for the installation and delivered within the available budget and schedule.

5.3.3. COMPUTATION OF AREAS: See APPENDIX Q for how to compute gross and net areas of the facility(ies).

5.3.4. BUILDING EXTERIOR: Design buildings to enhance or compliment the visual environment of the Installation. Where appropriate, reflect a human scale to the facility. Building entrance should be architecturally defined and easily seen. When practical, exterior materials, roof forms, and detailing shall be compatible with the surrounding development and adjacent buildings on the Installation and follow locally established architectural themes. Use durable materials that are easy to maintain. Exterior colors shall conform to the Installation requirements. See paragraph 6.

5.3.4.1. Building Numbers: Permanently attach exterior signage on two faces of each building indicating the assigned building number or address. Building number signage details and locations shall conform to Appendix H, Exterior Signage.

### 5.3.5. BUILDING INTERIOR

5.3.5.1. Space Configuration: Arrange spaces in an efficient and functional manner in accordance with area adjacency matrices.

5.3.5.2. Surfaces: Appearance retention is the top priority for building and furniture related finishes. Provide low maintenance, easily cleaned room finishes that are commercially standard for the facility occupancy specified, unless noted otherwise.

5.3.5.3. Color: The color, texture and pattern selections for the finishes of the building shall provide an aesthetically pleasing, comfortable, easily maintainable and functional environment for the occupants. Coordinate the building colors and finishes for a cohesive design. Select colors appropriate for the building type. Use color, texture and pattern to path or way find through the building. Trendy colors that will become dated shall be limited to non-permanent finishes such as carpet and paint. Select finishes with regards to aesthetics, maintenance, durability, life safety and image. Limit the number of similar colors for each material. Use medium range colors for ceramic and porcelain tile grout to help hide soiling. Plastic laminate and solid surface materials shall have patterns that are mottled, flecked or speckled. Coordinate finish colors of fire extinguisher cabinets, receptacle bodies and plates, fire alarms / warning lights, emergency lighting, and other miscellaneous items with the building interior. Match color of equipment items on ceilings (speakers, smoke detectors, grills, etc.) the ceiling color.

5.3.5.4. Circulation: Circulation schemes must support easy way finding within the building.

5.3.5.5. Signage: Provide interior signage for overall way finding and life safety requirements. A comprehensive interior plan shall be from one manufacturer. Include the following sign types: (1) Lobby Directory, (2) Directional Signs; (3) Room Identification Signs; (4) Building Service Signs; (5) Regulatory Signs; (6) Official and Unofficial Signs (7) Visual Communication Boards (8) NO SMOKING signage that conveys building smoking policy. Use of emblems or logos may also be incorporated into the signage plan.

5.3.5.6. Window Treatment: Provide interior window treatments with adjustable control in all exterior window locations for control of day light coming in windows or privacy at night. Maintain uniformity of treatment color and material to the maximum extent possible within a building.

5.3.5.7. Casework: Unless, otherwise specified, all casework for Cabinetry and cases shall be "custom grade", as described in the AWI Quality Standards.

#### 5.3.6. COMPREHENSIVE INTERIOR DESIGN

5.3.6.1. Comprehensive Interior Design includes the integration of a Structural Interior Design (SID) and a Furniture, Fixtures and Equipment (FF&E) design and package. SID requires the design, selection and coordination of interior finish materials that are integral to or attached to the building structure. Completion of a SID involves the selection and specification of applied finishes for the building's interior features including, but not limited to, walls, floors, ceilings, trims, doors, windows, window treatments, built-in furnishings and installed equipment, lighting, and signage. The SID package includes finish schedules, finish samples and any supporting interior elevations, details or plans necessary to communicate the building finish design and build out. The SID also provides basic space planning for the anticipated FF&E requirements in conjunction with the functional layout of the building and design issues such as life safety, privacy, acoustics, lighting, ventilation, and accessibility. See Section 01 33 16 for SID design procedures.

5.3.6.2. The FF&E design and package includes the design, selection, color coordination and of the required furnishing items necessary to meet the functional, operational, sustainability, and aesthetic needs of the facility coordinated with the interior finish materials in the SID. The FF&E package includes the specification, procurement documentation, placement plans, ordering and finish information on all freestanding furnishings and accessories, and a cost estimate. Coordinate the selection of furniture style, function and configuration with the defined requirements. Examples of FF&E items include, but are not limited to workstations, seating, files, tables, beds, wardrobes, draperies and accessories as well as marker boards, tack boards, and presentation screens. Criteria for furniture selection include function and ergonomics, maintenance, durability, sustainability, comfort and cost. See Section 01 33 16 for FFE design procedures.

#### 5.4. STRUCTURAL DESIGN

5.4.1. STANDARDS AND CODES: The structural design shall conform to APPLICABLE CRITERIA.

5.4.2. GENERAL: The structural system must be compatible with the intended functions and components that allows for future flexibility and reconfigurations of the interior space. Do not locate columns, for instance, in rooms requiring visibility, circulation or open space, including, but not limited to entries, hallways, common areas, classrooms, etc. Select an economical structural system based upon facility size, projected load requirements and local availability of materials and labor. Base the structural design on accurate, site specific geotechnical information and anticipated loads for the building types and geographical location. Consider climate conditions, high humidity, industrial atmosphere, saltwater exposure, or other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coatings on structural members, expansion joints, the level of corrosion protection, and the structural systems. Analyze, design and detail each building as a complete structural system. Design structural elements to preclude damage to finishes, partitions and other frangible, non-structural elements to prevent impaired operability of moveable components; and to prevent cladding leakage and roof ponding. Limit deflections of structural members to the allowable of the applicable material standard, e.g., ACI, AISC, Brick Industry Association, etc. When modular units or other pre-fabricated construction is used or combined with stick-built construction, fully coordinate and integrate the overall structural design between the two different or interfacing construction types. If the state that the project is located in requires separate, specific licensing for structural engineers (for instance, such as in Florida, California and others), then the structural engineer designer of record must be registered in that state.

5.4.3. LOADS: See paragraph 3 for facility specific (if applicable) and paragraph 6 for site and project specific structural loading criteria. Unless otherwise specified in paragraph 6, use Exposure Category C for wind. If not specified, use Category C unless the Designer of Record can satisfactorily justify another Exposure Category in its design analysis based on the facility Master Plan. Submit such exceptions for approval as early as possible and prior to the Interim Design Submittal in Section "Design After Award". Design the ancillary building items, e.g. doors, window jambs and connections, overhead architectural features, systems and equipment bracing, ducting, piping, etc. for gravity, seismic, lateral loads and for the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but is not limited to, the following items under the design loads prescribed in UFC 4-010-01:

- (a) Supporting members of glazed elements, e.g. window jamb, sill, header
- (b) Connections of glazed element to supporting members, e.g. window to header
- (c) Connections of supporting members to each other, e.g. header to jamb
- (d) Connections of supporting members to structural system, e.g. jamb to foundation.

5.4.4. TERMITE TREATMENT: (Except Alaska) Provide termite prevention treatment in accordance with Installation and local building code requirements, using licensed chemicals and licensed applicator firm.

## 5.5. THERMAL PERFORMANCE

5.5.1. STANDARDS AND CODES: Building construction and thermal insulation for mechanical systems shall conform to APPLICABLE CRITERIA.

5.5.2. BUILDING ENVELOPE SEALING PERFORMANCE REQUIREMENT. Design and construct the building envelope for office buildings, office portions of mixed office and open space (e.g., company operations facilities), dining, barracks and instructional/training facilities with a continuous air barrier to control air leakage into, or out of, the conditioned space. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness on the drawings. The use of painted interior walls is not an acceptable air barrier method.

5.5.2.1. Trace a continuous plane of air-tightness throughout the building envelope and make flexible and seal all moving joints.

5.5.2.2. The air barrier material(s) must have an air permeance not to exceed 0.004 cfm / sf at 0.3" wg (0.02 L/s.m2 @ 75 Pa) when tested in accordance with ASTM E 2178

5.5.2.3. Join and seal the air barrier material of each assembly in a flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of these assemblies and components.

5.5.2.4. Support the air barrier so as to withstand the maximum positive and negative air pressure to be placed on the building without displacement, or damage, and transfer the load to the structure.

5.5.2.5. Seal all penetrations of the air barrier. If any unavoidable penetrations of the air barrier by electrical boxes, plumbing fixture boxes, and other assemblies are not airtight, make them airtight by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly.

5.5.2.6. The air barrier must be durable to last the anticipated service life of the assembly.

5.5.2.7. Do not install lighting fixtures with ventilation holes through the air barrier

5.5.2.8. Provide a motorized damper in the closed position and connected to the fire alarm system to open on call and fail in the open position for any fixed open louvers at elevator shafts. Coordinate the motorized elevator hoistway vent damper(s) with the Fire Protection System design in paragraph 5.10. Ensure that the damper(s) is accessible to facilitate regular inspection and maintenance.

5.5.2.9. Damper and control to close all ventilation or make-up air intakes and exhausts, , etc., when leakage can occur during inactive periods. Atrium smoke exhaust and intakes shall only open when activated per IBC and other applicable Fire Code requirements.

5.5.2.10. Compartmentalize garages under buildings by providing air-tight vestibules at building access points.

5.5.2.11. Compartmentalize spaces under negative pressure such as boiler rooms and provide make-up air for combustion.

5.5.2.12. Performance Criteria and Substantiation: Submit the qualifications and experience of the testing entity for approval. Demonstrate performance of the continuous air barrier for the opaque building envelope by the following tests:

(a) Develop an Air Barrier Quality Control plan to assure that a competent air barrier inspector/specialist inspects the critical components prior to them being concealed. At a minimum, three onsite inspections are required during construction to assure the completeness of the construction and design.

(b) Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25cfm/ft<sup>2</sup> at a pressure differential of 0.3" w.g.(75 Pa) in accordance with ASTM's E 779 (2003) or E-1827-96 (2002). Accomplish tests using both pressurization and depressurization.. Divide the volume of air leakage in cfm @ 0.3" w.g. (L/s @ 75 Pa) by the area of the pressure boundary of the building, including roof or ceiling, walls and floor to produce the air leakage rate in cfm/ft<sup>2</sup> @ 0.3" w.g. (L/s.m<sup>2</sup> @ 75 Pa). Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner.

(c) Test the completed building using Infrared Thermography testing. Use infrared cameras with a resolution of 0.1deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90(1997). Determine air leakage pathways using ASTM E 1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems, and perform corrective work as necessary to achieve the whole building air leakage rate specified in (a) above.

(d) Notify the Government at least three working days prior to the tests to provide the Government the opportunity to witness the tests. Provide the Government written test results confirming the results of all tests.

## 5.6. PLUMBING

5.6.1. STANDARDS AND CODES: The plumbing system shall conform to APPLICABLE CRITERIA.

5.6.2. PRECAUTIONS FOR EXPANSIVE SOILS: Where expansive soils are present, include design features for underslab piping systems and underground piping serving chillers, cooling towers, etc, to control forces resulting from soil heave. Some possible solutions include, but are not necessarily limited to, features such as flexible expansion joints, slip joints, horizontal offsets with ball joints, or multiple bell and spigot gasketed fittings. For structurally supported slabs, suspend piping from the structure with adequate space provided below the pipe for the anticipated soil movement.

5.6.3. HOT WATER SYSTEMS: For Hot Water heating and supply, provide a minimum temp of 140 Deg F in the storage tank and a maximum of 110 Deg F at the fixture, unless specific appliances or equipment specifically require higher temperature water supply.

5.6.4. SIZING HOT WATER SYSTEMS: Unless otherwise specified or directed in paragraph 3, design in accordance with ASHRAE Handbook Series (appropriate Chapters), ASHRAE Standard 90.1, and the energy conservation requirements of the contract. Size and place equipment so that it is easily accessible and removable for repair or replacement.

5.6.5. JANITOR CLOSETS: In janitor spaces/room/closets, provide at minimum, a service sink with heavy duty shelf and wall hung mop and broom rack(s).



5.6.6. FLOOR DRAINS: As a minimum, provide floor drains in mechanical rooms and areas, janitor spaces/rooms/closets and any other area that requires drainage from fixtures or equipment, drain downs, condensate, as necessary.

5.6.7. URINALS: Not Used.

5.6.8. BUILDING WATER USE REDUCTION. Reduce building potable water use in each building 30 percent using IPC fixture performance requirements baseline.

5.6.9. Do not use engineered vent or Sovent® type drainage systems.

5.6.10. Where the seasonal design temperature of the cold water entering a building is below the seasonal design dew point of the indoor ambient air, and where condensate drip will cause damage or create a hazard, insulate plumbing piping with a vapor barrier type of insulation to prevent condensation. Do not locate water or drainage piping over electrical wiring or equipment unless adequate protection against water (including condensation) damage is provided. Insulation alone is not adequate protection against condensation. Follow ASHRAE Fundamentals Chapter 23, Insulation for Mechanical Systems, IMC paragraph 1107 and International Energy Conservation Code for pipe insulation requirements.

5.6.11. Cover all drain, waste and vent piping to prevent mortar or other debris from being flushed down and blocking pipes during such construction activities.

## 5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

5.7.1. STANDARDS AND CODES: The electrical systems for all facilities shall conform to APPLICABLE CRITERIA.

5.7.2. MATERIALS AND EQUIPMENT: Materials, equipment and devices shall, as a minimum, meet the requirements of Underwriters Laboratories (UL) where UL standards are established for those items. Wiring for branch circuits shall be copper. Motors larger than one-half horsepower shall be three phase. All electrical systems shall be pre-wired and fully operational unless otherwise indicated. Wall mounted electrical devices (power receptacles, communication outlets and CATV outlets) shall have matching colors, mounting heights and faceplates.

5.7.3. POWER SERVICE: Primary service from the base electrical distribution system to the pad-mounted transformer and secondary service from the transformer to the building service electrical equipment room shall be underground. See paragraph 6 for additional site electrical requirements.

5.7.3.1. Spare Capacity: Provide 10% space for future circuit breakers in all panelboards serving residential areas of buildings and 15% spaces in all other panelboards.

5.7.4. TELECOMMUNICATION SERVICE: Connect the project's facilities to the Installation telecommunications (voice and data) system through the outside plant (OSP) telecommunications underground infrastructure cabling system per the I3A Criteria. Connect to the OSP cabling system from each facility main cross connect located in the telecommunications room.

5.7.5. LIGHTING: Comply with the recommendations of the Illumination Engineering Society of North America (IESNA), the National Energy Policy Act and Energy Star requirements for lighting products..

### 5.7.5.1. Interior Lighting:

(a) Reflective Surfaces: Coordinate interior architectural space surfaces and colors with the lighting systems to provide the most energy-efficient workable combinations.

(b) High Efficiency Fluorescent Lighting: Utilize NEMA premium electronic ballasts and energy efficient fluorescent lamps with a Correlated Color Temperature (CCT) of 4100K. Linear fluorescent and compact fluorescent fixtures shall have a Color Rendering Index of (CRI) of 87 or higher. Fluorescent lamps shall be the low mercury type qualifying as non-hazardous waste upon disposal. Do not use surface mounted fixtures on acoustical tile ceilings. Provide an un-switched fixture with emergency ballast shall be provided at each entrance to the building.

(c) Solid State Lighting: Fixtures shall provide lighting with a minimum Correlated Color Temperature (CCT) of 4100K and shall have a Color Rendering Index of (CRI) of 75 or higher. Verify performance of the light producing solid state components by a test report in compliance with the requirements of IESNA LM 80. Verify performance of the solid state light fixtures by a test report in compliance with the requirements of IESNA LM 79. Provide lab results by a NVLAP certified laboratory. The light producing solid state components and drivers shall have a life expectancy of 50,000 operating hours while maintaining at least 70% of original illumination level. Provide a complete five year warranty for fixtures.

(d) Metal Halide Lighting (where applicable): Metal Halide lamp fixtures in the range of 150-500 Watts shall be pulse start type and have a minimum efficiency rating of 88%.

(e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (classrooms, conference rooms) to promote the productivity, comfort and well being of the building occupants. In office spaces, the preferred lighting should be a 30 FC ambient lighting level with occupancy sensor controlled task lighting in the work spaces to provide a composite lighting level of 50 FC on the working surfaces. Consider incorporating daylighting techniques for the benefit of reducing lighting energy requirements while improving the quality of the indoor spaces. If daylight strategies are used, additional coordination is required with the architect and mechanical engineer. Additionally, incorporate electric lighting controls to take advantage of the potential energy savings.

(f) Exterior Lighting: See paragraph 6.9 for site specific information, if any, on exterior lighting systems. Minimize light pollution and light trespass by not over lighting and use cut-off type exterior luminaries.

5.7.6. TELECOMMUNICATION SYSTEM: Building telecommunications cabling systems (BCS) and OSP telecommunications cabling system shall conform to APPLICABLE CRITERIA, including but not limited to I3A Technical Criteria. An acceptable BCS encompasses, but is not limited to, copper and fiber optic (FO) entrance cable, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, workstation outlets, racks, cable management, patch panels, cable tray, cable ladder, conduits, grounding, and labeling.. Items included under OSP infrastructure encompass, but are not limited to, manhole and duct infrastructure, copper cable, fiber optic cable, cross connects, terminations, cable vaults, and copper and FO entrance cable.

5.7.6.1. Design, install, label and test all telecommunications systems in accordance with the I3A Criteria and ANSI/TIA/EIA 568, 569, and 606 standards. A Building Industry Consulting Services International (BICSI) Registered Communications Distribution Designer (RCDD) with at least 2 yrs related experience shall develop and stamp telecommunications design, and prepare the test plan. See paragraph 5.8.2.5 for design of environmental systems for Telecommunications Rooms.

5.7.6.2. The installers assigned to the installation of the telecommunications system or any of its components shall be regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. Key personnel; i.e., supervisors and lead installers assigned to the installation of this system or any of its components shall be BICSI Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification for each of the key personnel. In lieu of BICSI certification, supervisors and installers shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products.

5.7.6.3. Perform a comprehensive end to end test of all circuits to include all copper and fiber optic cables upon completion of the BCS and prior to acceptance of the facility. Provide adequate advanced notification to the COR to allow COR and Installation personnel attendance. The BCS circuits include but are not limited to all copper and fiber optic(FO) entrance cables, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, and workstation outlets. Test in accordance with ANSI/EIA/TIA 568 standards. Use test instrumentation that meets or exceeds the standard. Submit the official test report to include test procedures, parameters tested, values, discrepancies and corrective actions in electronic format. Test and accomplish all necessary corrective actions to ensure that the government receives a fully operational, standards based, code compliant telecommunications system.

5.7.7. LIGHTNING PROTECTION SYSTEM: Provide a lightning protection system where recommended by the Lightning Risk Assessment of NFPA 780, Annex L.

5.8. HEATING, VENTILATING, AND AIR CONDITIONING

5.8.1. STANDARDS AND CODES: The HVAC system shall conform to APPLICABLE CRITERIA.

5.8.2. DESIGN CONDITIONS.

5.8.2.1. Outdoor and indoor design conditions shall be in accordance with UFC 3-410-01FA. Outdoor air and exhaust ventilation requirements for indoor air quality shall be in accordance with ASHRAE 62.1. All Buildings with minimum LEED Silver requirement (or better) will earn LEED Credit EQ 7.1, Thermal Comfort-Design., except where precluded by other project requirements. Where the contract specifies indoor design temperature, airflow, humidity conditions, etc., use those parameters.

5.8.2.2. High Humidity Areas: Design HVAC systems in geographical areas meeting the definition for high humidity in UFC 3-410-01FA to comply with the special criteria therein for humid areas.

5.8.2.3. Cooling equipment may be oversized by up to 15 percent to account for recovery from night setback. Heating equipment may be oversized by up to 30 percent to account for recovery from night setback. Design single zone systems and multi-zone systems to maintain an indoor design condition of 50% relative humidity for cooling only. For heating only where the indoor relative humidity is expected to fall below 20% for extended periods, add humidification to increase the indoor relative humidity to 30%. Provide ventilation air from a separate dedicated air handling unit (DOAU) for facilities using multiple single zone fan-coil type HVAC systems. Do not condition outside air through fan coil units. Avoid the use of direct expansion cooling coils in air handling units with constant running fans that handle outside air.

5.8.2.4. Locate all equipment so that service, adjustment and replacement of controls or internal components are readily accessible for easy maintenance.

5.8.2.5. Environmental Requirements for Telecommunications Rooms and Telecommunications Equipment Rooms, (including SIPRNET ROOMS, where applicable for specific facility type). Comply with ANSI/EIA/TIA 569 (including applicable Addenda). Maintain environmental conditions at the Class 1 and 2 Recommended Operating Environment. Before being introduced into the room, filter and pre-condition outside air to remove particles with the minimum MERV filtration quality shown in the ASHRAE HVAC Applications, Chapter 17. Maintain rooms under positive pressure relative to surrounding spaces. Design computer room air conditioning units specifically for telecommunications room applications. Build and test units in accordance with the requirements of ANSI/ASHRAE Standard 127. A complete air handling system shall provide ventilation, air filtration, cooling and dehumidification, humidification (as determined during the design phase), and heating. The system shall be independent of other facility HVAC systems and shall be required year round.

5.8.2.6. Fire dampers: dynamic type with a dynamic rating suitable for the maximum air velocity and pressure differential to which the damper is subjected. Test each fire damper with the air handling and distribution system running.

5.8.3. BUILDING AUTOMATION SYSTEM. Provide a Building Automation System consisting of a building control network as specified.

The building control network shall be a single complete non-proprietary Direct Digital Control (DDC) system for control of the heating, ventilating and air conditioning (HVAC) systems as specified herein. The building control network shall be an Open implementation of LONWORKS® technology using ANSI/EIA 709.1B as the only communications protocol and use only LonMark Standard Network Variable Types (SNVTs), as defined in the LonMark® Resource Files, for communication between DDC Hardware devices to allow multi-vendor interoperability.

5.8.3.1. The building automation system shall be open in that it is designed and installed such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without further dependence on the original Contractor. This includes, but is not limited to the following:

- (a) Install hardware such that individual control equipment can be replaced by similar control equipment from other equipment manufacturers with no loss of system functionality.
- (b) Necessary documentation (including rights to documentation and data), configuration information, configuration tools, programs, drivers, and other software shall be licensed to and otherwise remain with the

Government such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without subsequent or future dependence on the Contractor.

5.8.3.2. All DDC Hardware shall:

- (a) Be connected to a TP/FT-10 ANSI/EIA 709.3 control network.
- (b) Communicate over the control network via ANSI/EIA 709.1B exclusively.
- (c) Communicate with other DDC hardware using only SNVTs
- (d) Conform to the LonMark® Interoperability Guidelines.
- (e) Be locally powered; link power (over the control network) is not acceptable.
- (f) Be fully configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself to support the application. All settings and parameters used by the application shall be configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself
- (g) Provide input and output SNVTs required to support monitoring and control (including but not limited to scheduling, alarming, trending and overrides) of the application. Required SNVTs include but are not limited to: SNVT outputs for all hardware I/O, SNVT outputs for all setpoints and SNVT inputs for override of setpoints.
- (h) To the greatest extent practical, not rely on the control network to perform the application..

5.8.3.3. Controllers shall be Application Specific Controllers whenever an ASC suitable for the application exists. When an ASC suitable for the application does not exist use programmable controllers or multiple application specific controllers.

5.8.3.4. Application Specific Controllers shall be LonMark Certified whenever a LonMark Certified ASC suitable for the application exists. For example, VAV controllers must be LonMark certified.

5.8.3.5. Application Specific Controllers (ASCs) shall be configurable via an LNS plug-in whenever t an ASC with an LNS plug-in suitable for the application exists.

5.8.3.6. Each scheduled system shall accept a network variable of type SNVT\_occupancy and shall use this network variable to determine the occupancy mode. If the system has not received a value to this network variable for more than 60 minutes it shall default to a configured occupancy schedule.

5.8.3.7. Gateways may be used provided that each gateway communicates with and performs protocol translation for control hardware controlling one and only one package unit.

5.8.3.8. Not Used

5.8.3.9. Not Used

5.8.3.10. Provide the following to the Government for review prior to acceptance of the system:

- The latest version of all software and user manuals required to program, configure and operate the system.
- Points Schedule drawing that shows every DDC Hardware device. The Points Schedule shall contain the following information as a minimum:
  - Device address and NodeID.
  - Input and Output SNVTs including SNVT Name, Type and Description.
  - Hardware I/O, including Type (AI, AO, BI, BO) and Description.
  - Alarm information including alarm limits and SNVT information.
  - Supervisory control information including SNVTs for trending and overrides.
  - Configuration parameters (for devices without LNS plug-ins) Example Points Schedules are available at <https://eko.usace.army.mil/fa/besc/>
- Riser diagram of the network showing all network cabling and hardware. Label hardware with ANSI.CEA-709.1 addresses.
- Control System Schematic diagram and Sequence of Operation for each HVAC system.

- Operation and Maintenance Instructions including procedures for system start-up, operation and shut-down, a routine maintenance checklist, and a qualified service organization list.
- LONWORKS® Network Services (LNS®) database for the completed system.
- Quality Control (QC) checklist (below) completed by the Contractor's Chief Quality Control (QC) Representative

**Table 5-1: QC Checklist**

5.8.3.11. Perform a Performance Verification Test (PVT) under Government supervision prior to system acceptance. During the PVT demonstrate that the system performs as specified, including but not limited to demonstrating that the system is Open and correctly performs the Sequences of Operation.

5.8.3.12. Provide a 1 year unconditional warranty on the installed system and on all service call work. The warranty shall include labor and material necessary to restore the equipment involved in the initial service call to a fully operable condition.

5.8.3.13. Provide training at the project site on the installed building system. Upon completion of this training each student, using appropriate documentation, should be able to start the system, operate the system, recover the system after a failure, perform routine maintenance and describe the specific hardware, architecture and operation of the system.

•

5.8.4. TESTING, ADJUSTING AND BALANCING. Test and balance air and hydronic systems, using a firm certified for testing and balancing by the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or the Testing Adjusting, and Balancing Bureau (TABB). The prime contractor shall hire the TAB firm directly, not through a subcontractor. Perform TAB in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, i.e., AABC MN-1, NEBB TABES, or SMACNA HVACTAB unless otherwise specified herein. All recommendations and suggested practices contained in the TAB Standard shall be considered mandatory. Use the provisions of the TAB Standard, including checklists, report forms, etc., as nearly as practicable to satisfy the Contract requirements. Use the TAB Standard for all aspects of TAB, including qualifications for the TAB Firm and Specialist and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB Standard, adhere to the manufacturer's recommendations. All quality assurance provisions of the TAB Standard such as performance guarantees shall be part of this contract. For systems or system components not covered in the TAB Standard, the TAB Specialist shall develop TAB procedures. Where new procedures, requirements, etc., applicable to the Contract requirements have been published or adopted by the body responsible for the TAB Standard used (AABC, NEBB, or TABB), the requirements and recommendations contained in these procedures and requirements are mandatory.

5.8.5. COMMISSIONING: Commission all HVAC systems and equipment, including controls, and all systems requiring commissioning for LEED Enhanced commissioning, in accordance with ASHRAE Guideline 1.1, ASHRAE Guideline 0 and LEED. Do not use the sampling techniques discussed in ASHRAE Guideline 1.1 and in ASHRAE Guideline 0. Commission 100% of the HVAC controls and equipment. Hire the Commissioning Authority (CA), certified as a CA by AABC, NEBB, or TABB, as described in Guideline 1.1. The CA will be an independent subcontractor and not an employee of the Contractor nor an employee or subcontractor of any other subcontractor on this project, including the design professionals (i.e., the DOR or their firm(s)). The CA will communicate and report directly to the Government in execution of commissioning activities. The Contracting Officer's Representative will act as the Owner's representative in performance of duties spelled out under OWNER in Annex F of ASHRAE Guideline 0. All buildings with Minimum LEED Silver (or better) requirement will earn LEED Credit EA3 Enhanced Commissioning.

## 5.9. ENERGY CONSERVATION

5.9.1. The building including the building envelope, HVAC systems, service water heating, power, and lighting systems shall meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.2. Design all building systems and elements to meet the minimum requirements of ANSI/ASHRAE/IESNA 90.1. Design the buildings, including the building envelope, HVAC systems, service water heating, power, and

lighting systems to achieve an energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1. Energy calculation methodologies and substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.3. Purchase Energy Star products, except use FEMP designated products where FEMP is applicable to the type product. The term "Energy Star product" means a product that is rated for energy efficiency under an Energy Star program. The term "FEMP designated product" means a product that is designated under the Federal Energy Management Program of the Department of Energy as being among the highest 25 percent of equivalent products for energy efficiency. When selecting integral sized electric motors, choose NEMA PREMIUM type motors that conform to NEMA MG 1, minimum Class F insulation system. Motors with efficiencies lower than the NEMA PREMIUM standard may only be used in unique applications that require a high constant torque speed ratio (e.g., inverter duty or vector duty type motors that conform to NEMA MG 1, Part 30 or Part 31).

5.9.4. Solar Hot Water Heating. Provide at least 30% of the domestic hot water requirements through solar heating methodologies, unless the results of a Life Cycle Cost Analysis (LCCA) developed utilizing the Building Life Cycle Cost Program (BLCC) which demonstrates that the solar hot water system is not life cycle cost effective in comparison with other hot water heating systems. The type of system will be established during the contract or task order competition and award phase, including submission of an LCCA for government evaluation to justify non-selection of solar hot water heating. The LCCA uses a study period of 25 years and the Appendix K utility cost information. The LCCA shall include life cycle cost comparisons to a baseline system to provide domestic hot water without solar components, analyzing at least two different methodologies for providing solar hot water to compare against the baseline system.

5.9.5. Process Water Conservation. When potable water is used to improve a building's energy efficiency, employ lifecycle cost effective water conservation measures, except where precluded by other project requirements.

5.9.6. Renewable Energy Features. The Government's goal is to implement on-site renewable energy generation for Government use when lifecycle cost effective. See Paragraph 6, PROJECT SPECIFIC REQUIREMENTS for renewable energy requirements for this project.

## 5.10. FIRE PROTECTION

5.10.1. STANDARDS AND CODES Provide the fire protection system conforming to APPLICABLE CRITERIA.

5.10.2. Inspect and test all fire suppression equipment and systems, fire pumps, fire alarm and detection systems and mass notification systems in accordance with the applicable NFPA standards. The fire protection engineer of record shall witness final tests. The fire protection engineer of record shall certify that the equipment and systems are fully operational and meet the contract requirements. Two weeks prior to each final test, the contractor shall notify, in writing, the installation fire department and the installation public work representative of the test and invite them to witness the test.

5.10.3. Fire Extinguisher Cabinets: Provide fire extinguisher cabinets and locations for hanging portable fire extinguishers in accordance with NFPA 10 Standard for Portable Fire Extinguishers. The Government will furnish and install portable fire extinguishers, which are personal property, not real property installed equipment.

5.10.4. Fire alarm and detection system: Required fire alarm and detection systems shall be the addressable type. Fire alarm initiating devices, such as smoke detectors, heat detectors and manual pull stations shall be addressable. When the system is in alarm condition, the system shall annunciate the type and location of each alarm initiating device. Sprinkler water flow alarms shall be zoned by building and by floor. Supervisory alarm initiating devices, such as valve supervisory switches, fire pump running alarm, low-air pressure on dry sprinkler system, etc. shall be zoned by type and by room location.

5.10.5. Roof Access: Paragraph 2-9 of UFC 3-600-01 Fire Protection for Facilities will be modified in the next update to that UFC. Pending revision, comply with roof access and stairway requirements in accordance with the International Building Code. Where roof access is required by the IBC or other criteria, comply with UFC 4-010-01, Anti-Terrorist Force Protection, Standard 14. "Roof Access".

5.10.6. Fire Protection Engineer Qualifications: In accordance with UFC 3-600-01, FIRE PROTECTION ENGINEERING FOR FACILITIES, the fire protection engineer of record shall be a registered professional engineer

(P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES), or a registered P.E. in a related engineering discipline with a minimum of 5 years experience, dedicated to fire protection engineering that can be verified with documentation.

#### 5.11. SUSTAINABLE DESIGN

5.11.1. STANDARDS AND CODES: Sustainable design shall conform to APPLICABLE CRITERIA. See paragraph 6, PROJECT-SPECIFIC REQUIREMENTS for which version of LEED applies to this project. The LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC) applies to all projects. Averaging may be used for LEED compliance as permitted by the AGMBC but is restricted to only those buildings included in this project. Each building must individually comply with the requirements of paragraphs ENERGY CONSERVATION and BUILDING WATER USE REDUCTION.

5.11.2. LEED RATING, REGISTRATION, VALIDATION AND CERTIFICATION: See Paragraph PROJECT-SPECIFIC REQUIREMENTS for project minimum LEED rating/achievement level, for facilities that are exempt from the minimum LEED rating, for LEED registration and LEED certification requirements and for other project-specific information and requirements.

5.11.2.1. Innovation and Design Credits. LEED Innovation and Design (ID) credits are acceptable only if they are supported by formal written approval by GBCI (either published in USGBC Innovation and Design Credit Catalog or accompanied by a formal ruling from GBCI). LEED ID credits that require any Owner actions or commitments are acceptable only when Owner commitment is indicated in paragraph PROJECT-SPECIFIC REQUIREMENTS or Appendix LEED Project Credit Guidance

5.11.3. OPTIMIZE ENERGY PERFORMANCE. : Project must earn, as a minimum, the points associated with compliance with paragraph ENERGY CONSERVATION. LEED documentation differs from documentation requirements for paragraph ENERGY CONSERVATION and both must be provided. For LEED-NC v2.2 projects you may substitute ASHRAE 90.1 2007 Appendix G in its entirety for ASHRAE 90.1 2004 in accordance with USGBC Credit Interpretation Ruling dated 4/23/2008.

5.11.4. COMMISSIONING. See paragraph 5.8.5 COMMISSIONING for commissioning requirements. USACE templates for the required Basis of Design document and Commissioning Plan documents are available at <http://en.sas.usace.army.mil> (click on Engineering Criteria) and may be used at Contractor's option.

5.11.5. DAYLIGHTING. Except where precluded by other project requirements, do the following in at least 75 percent of all spaces occupied for critical visual tasks: achieve a 2 percent glazing factor (calculated in accordance with LEED credit EQ8.1) OR earn LEED Daylighting credit, provide appropriate glare control and provide either automatic dimming controls or occupant-accessible manual lighting controls.

5.11.6. LOW-EMITTING MATERIALS. Except where precluded by other project requirements, use materials with low pollutant emissions, including but not limited to composite wood products, adhesives, sealants, interior paints and finishes, carpet systems and furnishings,

5.11.7. CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT. Except where precluded by other project requirements, earn LEED credit EQ 3.1 Construction IAQ Management Plan, During Construction and credit EQ 3.2 Construction IAQ Management Plan, Before Occupancy.

5.11.8. RECYCLED CONTENT. In addition to complying with section RECYCLED/RECOVERED MATERIALS, earn LEED credit MR4.1, Recycled Content, 10 percent except where precluded by other project requirements.

5.11.9. BIOBASED AND ENVIRONMENTALLY PREFERABLE PRODUCTS. Except where precluded by other project requirements, use materials with biobased content, materials with rapidly renewable content, FSC certified wood products and products that have a lesser or reduced effect on human health and the environment over their lifecycle to the maximum extent practicable.

5.11.10. FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM (FB4P). The Farm Security and Rural Investment Act (FSRIA) of 2002 required the U.S. Department of Agriculture (USDA) to create procurement preferences for biobased products that are applicable to all federal procurement (to designate products for biobased content). For all designated products that are used in this project, meet USDA biobased

content rules for them except use of a designated product with USDA biobased content is not required if the biobased product (a) is not available within a reasonable time, (b) fails to meet performance standard or (c) is available only at an unreasonable price. For biobased content product designations, see <http://www.biopreferred.gov/ProposedAndFinalItemDesignations.aspx>.

5.12. CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT: Achievement of 50% diversion, by weight, of all non-hazardous C&D waste debris is required. Reuse of excess soils, recycling of vegetation, alternative daily cover, and wood to energy are not considered diversion in this context, however the Contractor must track and report it. A waste management plan and waste diversion reports are required, as detailed in Section 01 57 20.00 10, ENVIRONMENTAL PROTECTION.

5.13. SECURITY (ANTI-TERRORISM STANDARDS): Unless otherwise specified in Project Specific Requirements, only the minimum protective measures as specified by the current Department of Defense Minimum Antiterrorism Standards for Buildings, UFC 4-010-01, are required for this project. The element of those standards that has the most significant impact on project planning is providing protection against explosives effects. That protection can either be achieved using conventional construction (including specific window requirements) in conjunction with establishing relatively large standoff distances to parking, roadways, and installation perimeters or through building hardening, which will allow lesser standoff distances. Even with the latter, the minimum standoff distances cannot be encroached upon. These setbacks will establish the maximum buildable area. All standards in Appendix B of UFC 4-010-01 must be followed and as many of the recommendations in Appendix C that can reasonably be accommodated should be included. The facility requirements listed in these specifications assume that the minimum standoff distances can be met, permitting conventional construction. Lesser standoff distances (with specific minimums) are not desired, however can be provided, but will require structural hardening for the building. See Project Specific Requirements for project specific siting constraints. The following list highlights the major points but the detailed requirements as presented in Appendix B of UFC 4-010-01 must be followed.

- (a) Standoff distance from roads, parking and installation perimeter; and/or structural blast mitigation
- (b) Blast resistant windows and skylights, including glazing, frames, anchors, and supports
- (c) Progressive collapse resistance for all facilities 3 stories or higher. Unless determined otherwise by the Installation and noted in paragraphs 3 or 6, the building shall be considered to have areas of uncontrolled public access when designing for progressive collapse.
- (d) Mass notification system (shall also conform to UFC 4-021-01, Mass Notification Systems)
- (e) For facilities with mailrooms (see paragraph 3 for applicability) – mailrooms have separate HVAC systems and are sealed from rest of building



## **6.0 PROJECT SPECIFIC REQUIREMENTS**

### **6.1. GENERAL**

The requirements of this paragraph augment the requirements indicated in Paragraphs 3 through 5.

### **6.2. APPROVED DEVIATIONS**

The following are approved deviations from the requirements stated in Paragraphs 3 through 5 that only apply to this project.

(1) 6.5.3 Programmable Electronic Key Card Access System: This facility will not use Keyless Card Access System for entry. This section has been altered to include the requirements for keying and installation of final lock cores for all of the facilities doors. The information regarding what is to be provided to Ft Polk DPW is also provided in paragraph 6.5.3.3 of the section.

(2) Construction limits are shown in the site work drawings included in Appendix JJ.

(3) Section 01 00 00, paragraph 5.9.2. The requirement to achieve energy consumption 40% below the stated baseline is revised to 30% below the stated baseline.

(4) Ceiling tiles where installed shall be 2 X 2 moisture resistant tiles.

(5) Para. 3.3.7 1. (d) 1(a) Communication and SIPRNET Rooms are to remain separate.

(6) Para. 3.3.7 1 (g) 1 No SIPRNET Safe or Container will be used.

#### **(AM#3)**

(7) Section 01 10 00 Para. 3.3.3 c) backflow preventer should be installed outside the building in a lockable hot box.

#### **(/AM#3)**

#### **(AM#4)**

Ref Para 3.1.4. Exception to referenced paragraph is that handicapped parking will be provided per the site drawings provided in this solicitation.

#### **(/AM#4)**

### **6.3. SITE PLANNING AND DESIGN**

#### **6.3.1. General:**

The Site Work Documents included in Appendix JJ shall be used as a basis for final design to be provided by Contractor. Configuration of Building, Flatwork, and utilities have been coordinated with Fort Polk DPW and should only be modified if required by code, or site conditions.

a. See Site Work Documents (Included as Appendix JJ) for the location of the project, haul routes, and spoils disposal. Excess clean spoil shall be disposed of on the Installation at the southwest corner of the intersection of Chaffee Road and Exchange Road (refer to the Site Work Documents for additional information). Concrete and asphalt debris can be disposed on a site east of the intersection of Chaffee Road and Magazine Road, as shown on the Site Work Documents. All other disposals shall be off Government controlled property and at the contractor's expense. Construction limits shall be confined as shown on Sheet C-102 of the Site Work Documents. Connection points for utilities, as well as utility relocates shown in the site development plans are the suggestion of the RFP writer. The Contractor is responsible for the final design of utility connections.

- b. The Site Work Documents provided by the Government are included in Appendix JJ. Any discrepancies which are found in the furnished plans shall be immediately brought to the attention of the Contracting Officer's Representative (COR). Borings, boring location map, subsurface condition data, and the geotechnical report provided by the Government are furnished as part of the RFP and are included in the Appendices.
- c. The contractor shall accept the site as is, be solely responsible for all work required to complete this project. The Contractor's pad preparation operations shall be confined to the work area.
- d. General Contractor Construction Trailer areas are available on a first come first serve basis at Service Command Loop (see Site Work Documents). ~~(AM#4) Construction Trailers will not be permitted within Construction Limits~~ **(AM#4)**. Contractor shall not construct or stage outside of "Approximate Limits of Work" as shown on said sheet. The contractor is required to meter and pay for the electrical power, gas, and water utilized during construction.
- e. All contractor vehicles shall be registered with the installation. Complete registration must be completed ten working days prior to bringing the vehicle onto the installation. All must have a valid vehicle registration, insurance and driver's license. The contractor shall coordinate through the COR.
- f. The contractor shall be responsible for the site preparation, construction site fencing, temporary construction access drives and maintenance of the compound at all times. Upon completion of the project and after removal of materials and equipment from within the construction zone, the construction fence shall be removed and will become the property of the contractor. Areas used by the contractor for the storage of equipment, material or other use, shall be restored to the original or better condition.
- g. The contractor will be responsible for providing temporary construction utilities; it may be necessary, initially, for the contractor to truck water to the site until utilities are constructed.
- h. The contractor is responsible for connection of all utilities from the building to the service connection points, as well as relocating the sanitary sewer main. The contractor shall be responsible for coordination with Site Work Documents and the utility providers/installation through the COR.
- i. The Water and Sanitary Sewer Services on this installation are privatized by American Water Enterprise Military Services Group (American Water). The Contractor shall adhere to the latest version of the AMERICAN WATER MILITARY SERVICE GROUP DESIGN GUIDE FOR WATER AND WASTEWATER FACILITIES -FORT HOOD. A link to their general website and the October 2010 version of the Design guide has been included in Appendix MM. The Contractor is required to submit a Permit Application for Water and Sewer Taps and Line Installations to American Water for approval. All water and sanitary sewer construction requires plans and documentation sealed by a Professional Engineer Registered in the State of Louisiana, and shall be inspected by American Water. All submittals, correspondence, and inspections shall be submitted to American Water through the COR. The Contractor's Water and Sanitary Sewer design will also have to be approved by the State of Louisiana, refer to American Water's Design Guide for further information.

The Contractor shall adhere to Louisiana's Title 51 Public Health - Sanitary Code Part XII. Water Supplies, Part XIII Sewage Disposal, and Part XIV Plumbing. State and Federal Law, and the Louisiana Sanitary Code, requires that – prior to the start of construction – approval by the Louisiana Department of Health and Hospitals (LDH&H) must be obtained for plans and specifications of all public water systems and wastewater systems. All extensions or modifications to the installations water or wastewater (W3) systems require submittal of plans and specifications to the LDH&H (Designed & Sealed by a Professional Engineer Registered in the State of Louisiana) for approval. Construction may not start until the State review and approval process is completed. The Contractor shall submit a design summary package to the LDH&H for review and approval:

DHH/OPH Central Region 6 Office

5604 B Coliseum Boulevard

Alexandria, Louisiana 71303

The design summary package shall consist of a cover letter briefly describing the project, the applicable filled out LDH&H design summary forms, and the Contractor's design drawings and specs. Refer to Appendix MM for a link to the LDH&H design summary forms.

#### 6.3.1.1. 115th Medical Company Operations Facility (COF)

The COF site is bound to the north by a TEMF Site (currently under construction), Texas Avenue to the East, and a forested area to the south, and west (Detention Pond for this site and adjacent TEMF will be built to the west of the COF. Trees have been removed for over 95% of the site, with the exception of the southwest corner. Approximately 50-100 feet of sewer line and possible detention / water quality pond(s) will be installed on the edge of the heavily forested area. Prior to any construction, the D/B contractor shall coordinate any additional tree removal with the Ft Polk Environmental office through the Contracting Officer. The D/B contractor shall be responsible for conducting a site survey of construction area. All standing timber on the construction site remains property of the government. Once a site plan is generated, submitted, and approved by the government, the D/B contractor will locate and mark any trees requiring removal. The D/B contractor then shall allow for a two (2) week period of coordination with Ft Polk Environmental & Forestry to have all marked trees removed if deemed marketable. Only after the timber is taken or noted unmarketable, the remaining material becomes the D/B Contractor's property to remove and dispose of off site.

The site has been recently logged, with associated debris left in place. Debris, stumps, roots and all other material left in place from logging operation will need to be removed as part of site work. There is also an existing asphalt parking area to be demolished. See Site Demolition plan attached in the Site Work Documents for pictures of site. Site infrastructure points of connection to existing utilities have been identified within the Site Work Documents, however the Contractor is not required to connect at given locations. Coordination, design and construction of all utilities, building pads, compaction, termite pretreatment (refer to the Appendix), sidewalks, final grading, plantings/landscaping, bollards and site furnishings are the responsibility of the contractor. The contractor's operations shall be limited to the site and excess soil may not be wasted off the Military Installation without written Governmental approval. The Contractor will not receive additional compensation for materials wasted off the Military Installation.

#### 6.3.1.2 Grading Requirements:

a. Finished Floor Elevations: A building's finished floor elevation shall be a minimum of 12 inches above the highest point of the adjacent outside finished grade.

b. Turf Areas Adjacent to Buildings: For all turfed and unpaved areas adjacent to buildings the contractor shall slope away from the building at a minimum of 5% grade for the first 10 feet to 30 feet. These requirements shall be indicated on the Design - Build Contractor's grading plans with critical spot elevations (changes in grade) clearly labeled.

c. Lawn Areas: Lawn areas beyond the turfed areas adjacent to buildings in Part 6.3.1.2. b. shall have a minimum of 2% slope and maximum desirable slope of 20%. If it becomes necessary to use slopes steeper than 20% slope protection shall be provided. The type and amount of slope protection provided shall be based on the soil type, slope length, and aesthetic, environmental, and economic considerations.

d. Ditches and Swales: Drainage Channels, Ditches, and Swales: The contractor shall use a minimum longitudinal slope of 0.30% or steeper for all drainage channels, ditches or swales with a minimum velocity of 2 feet per second at full capacity. All drainage channels, ditches, or swales shall be designed with permanent Turf Reinforcement Mats (TRM) with vegetative grown in accordance with the most current Federal Highway Administration Hydraulic Engineering Circular No. 15 Design of Roadside Channels with Flexible Linings. The contractor shall provide calculations in the design analysis. The contractor shall ensure proper installation per the manufacturer's recommended methods and use of proper length and quantity of fasteners. The contractor shall ensure that within the permanent TRM the vegetative density of 95% and shall have vegetative stand a minimum of 4 inches tall. All seeding shall be native species on the Fort Polk Acceptable Plant List provided in Appendix I. No rock rip rap shall be used for erosion protection.

e. Roads, Streets, and Access Drives: Gradients for roads, streets and access drives shall be as outlined in AASHTO, *A Policy of Geometric Design of Highways and Streets*. Grade changes in excess of 1% shall be accomplished by means of vertical curves. The length of vertical curves will be determined in accordance with the

aforementioned AASHTO criteria. Profiles are mandatory for vertical control of centerline gradients. Roads, streets and highways shall be shown using plan and profile type drawings.

f. Parking Areas: Pavement grades shall provide positive surface drainage with a 1 percent minimum slope in the direction of drainage. Provide a maximum slope within a 90-degree parking space of 1.5 percent from front to rear end and 5 percent from side to side. Provide a maximum slope within a 45-degree or 60-degree parking space of 5 percent from front to rear end and 1 percent from side to side. Grade perpendicular to direction of parking 5 percent maximum for bituminous or concrete surfaces and 3 percent for other surfaces.

g. Culverts: The recommended gradient of culverts shall be 0.5% with an absolute minimum of 0.3%. Concrete headwalls or end sections shall be provided for all culverts. Headwalls and end sections shall be designed to reduce velocities to levels that are non-erosive for the soil types encountered.

h. Sidewalks: Sidewalks parallel and adjacent to parking spaces shall be a minimum of 6 feet wide and all other sidewalk shall be minimum of 4 feet wide. All sidewalk longitudinal and cross slopes shall conform to the ADA Accessibility Guidelines for Buildings and Facilities.

i. Dumpsters: Concrete loading aprons shall be provided for the first 15 feet in front of the dumpster pads to accommodate loading and to avoid rutting of the pavement in front of the dumpsters. The contractor shall locate dumpster walls in accordance to UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings.

6.3.1.3 Design Submittal: Complete design calculations shall be included in a design analysis in accordance to the format and content of the 2003 Southwestern Division Architectural and Engineering Instructional Manual. Horizontal and vertical control shall be provided for all new facilities. The contractor shall provide Microstation Version 8.0 or later. All electronic drawings in accordance to the AEC 4.0 CADD standards.

#### 6.3.2. Site Structures and Amenities

a. Building Setback and Force Protection: Sitework has been laid out based on a uniconf configuration. The Contractor shall provide building designs that conform to the provided site layout without revision thereby meeting AT/FP setbacks, etc. Construction standoff distances and access control shall be designed in accordance with the AT/FP requirements of UFC 4-010-01 for Primary Gathering within a Controlled Perimeter. The site layout shall be based on the facility threat security level to protect against exterior attack by providing standoff distance between an aggressor or bomb, barriers, and to facilitate visual monitoring of the site. **(AM#5)** The Installation requires a minimal barrier be provided to separate POV parking and the COF facility in addition to minimum AT/FP requirements. This requirement shall be satisfied primarily by providing a curb along the west edge of the north - south sidewalk at the POV parking. Where no curb is provided at the handicapped parking area, properly spaced bollards or physical barriers such as planters shall be provided to maintain the desired protection. Bollards installed at these locations shall be non-removable. At service drives and access points, the bollards shall be removable and lockable. Note that bollard details included in site drawings do not include locking devices and are not acceptable as detailed. Storage slabs shall be provided for removable bollards. The knee wall shown on site documents is not required. **(/AM#5)**

b. Building Spacing: Fire department access, clearances and separations shall be maintained in accordance with UFC 3-600-01 and the International Building Code. The Building shall also conform to the AT/FP requirements of UFC 4-010-01.

c. Parking Areas: Paving, perimeter concrete curbs and gutters are required in the front of the building and preferred for the hardstand in the rear of the building. Final layout and associated grading shall be designed by the Contractor.

d. Service/ Access Drives: Service/access drives/loops and equipment hardstand areas are provided for in the Site Work Documents. Reference Geotechnical Report for Pavement recommendations.

e. Walks: A sidewalk paralleling the POV parking places are required and are provided for in the Site Work Documents. Additional walks designed and constructed to serve the facility shall not be located under the eave's drip line.

#### 6.3.3. Site Functional Requirements:

### 6.3.3.1. Stormwater Management (SWM) Systems.

A storm water pollution prevention plan (SWPPP) is required. The contractor will be the primary permittee for the construction site. Refer to the Site Work Documents included in the Appendix for additional information. Permitting with the LDH&H will be coordinated through the COR. The Contractor shall comply with the requirements for general permit Number LAR 100000. The contractor shall incorporate and edit Appendix LL section 01 57 24.03 44 STORM WATER POLLUTION PREVENTION PLAN (LOUISIANA) into their specifications.

6.3.3.1.1. Storm Drain System: A detention pond designed for the COF and adjacent TEMF will be built concurrently with this project by the TEMF Contractor. The pond will be designed for flow produced by the impervious cover added by this COF project. The minimum elevation of the pond will be at approximately 268, and the 1% A.C. storm water surface elevation should be at or below 272. The COF Contractor shall tie into these systems as appropriate for his areas of design responsibility. Design and construction of the storm drainage system shall be in accordance with Federal Aviation Administration Advisory Circular FAA AC 150-5320-5C, *Surface Drainage Design*; Federal Highway Administration Publication No. FHWA-NHI-01-021, *Hydraulic Engineering Circular No. 22, Second Edition, URBAN DRAINAGE DESIGN MANUAL*; and U.S. Weather Bureau Technical Paper No. 40, dated May 1961, *Rainfall Frequency Atlas of the United States for Durations from 30 minutes to 24 hours, and return periods from 1 to 100 years*. Design of drainage structures shall be based on a 10-year storm frequency. Design of the storm drainage system shall incorporate the principles of Low Impact Development (LID), as detailed in UFC 3-210-10 DESIGN: *LOW IMPACT DEVELOPMENT MANUAL*. *The contractor's design shall maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the site with regard to the temperature, rate, volume, and duration of flow in accordance with the Energy Independence and Security Act of 2007 (Section 438, EISA 2007).* Rate of flow will be regulated by the proposed detention pond. Manholes, surface inlets, and curb inlets shall be constructed of reinforced concrete or pre-cast reinforced concrete. Structures in pavement shall be designed to handle H-20 loading. The Contractor is responsible for designing the storm drainage system to be as economical as possible, while taking into account the topography, drainage area, and outfall locations, as well as coordination with existing drainage systems, and existing and future underground utilities, and detention pond. Profiles are required for underground storm drainage systems and sections are required for culverts.

a. Underground Systems: Whenever possible, pipe crowns shall be matched in elevations. Profiles of pipes shall show all existing and new underground utilities and pertinent surface features. The minimum pipe gradient shall be designed to provide a minimum velocity (full flow) of 3.0 fps. The new outfall and receiving channel must be designed to withstand the shear stress acting on the channel from the runoff to prevent erosion. New underground storm drainage pipes shall be sized by computation of backwater surface profiles. The minimum pipe size shall be 12 inches, unless the pipe is a part of the roof drain system, in which case the minimum size of laterals and collector pipes is 4 inches.

b. Street Drainage: Street drainage shall be accomplished by the use of curb and gutter and curb inlets. Curb gaps can be considered in areas where roadside ditches are used. The center one-third of the street shall not convey runoff during the passing of the design storm. Inverted crown sections for the streets shall not be used without prior approval. Curb inlets shall not be located in the radius of street intersections, at curb returns, or where pedestrian traffic is most likely to occur.

c. POV Parking and Hardstands: Do not concentrate the flow of storm runoff on asphalt pavement. Convey storm runoff within POV parking areas to perimeter curbs by sheet flow. However, if it is necessary to concentrate flow within a parking area, provide concrete paving at the swale flowline. Concentrated flow will not be permitted to flow from POV parking or hardstand areas onto adjacent gravel areas or turfed slopes. Sheet flow from parking areas and hardstands onto adjacent gravel or turfed areas must be examined for possible erosive effects.

d. The Contractor shall design and connect the roof drain system to an underground storm drain system.

### 6.3.3.2. Erosion and Sediment Control

A storm water pollution prevention plan (SWPPP) is required. The contractor will be the primary permittee on the Hospital COF. Contractor shall be responsible for coordinating SW3P with adjacent TEMF Project. The total area of both projects will exceed 10 acres. Refer to the Site Work Documents included in the Appendix for additional information. Permitting with the LDH&H will be coordinated through the COR. The Contractor shall comply with the

requirements for general permit Number LAR 100000. The contractor shall incorporate and edit Appendix LL section 01 57 24.03 44 STORM WATER POLLUTION PREVENTION PLAN (LOUISIANA) into their specifications.

The contractor shall be responsible for the Storm Water Pollution Prevention Plans (SWPPP) for the construction site in accordance with the paragraph above. The use of silt fences, mulch straw/hay bales around inlets and sediment traps to control erosion during construction shall be included. Refer to the Site Work Documents included in the Appendices for additional information, however the contractor will be responsible for final design & conformance.

#### 6.3.3.3. Vehicular Circulation.

Vehicular circulation to the hardstand directly adjacent & east of the COF is necessary, and requires a heavier pavement section as detailed in the Geotechnical Report provided by the government in the Appendix.

### 6.4. SITE ENGINEERING

#### 6.4.1. Existing Topographical Conditions

A three dimensional digital topographic and utility survey was completed for the site, and included in the Site Work Documents. Any additional topographic effort will be at the expense of the Contractor.

#### 6.4.2. Existing Geotechnical conditions: See Appendix A for a preliminary geotechnical report.

See Geotechnical Report attached as Appendix A.

#### 6.4.3. Fire Flow Tests See Appendix D for results of fire flow tests to use for basis of design for fire flow and domestic water supply requirements.

See Fire Flow Tests attached as Appendix D.

#### 6.4.4. Pavement Engineering and Traffic Estimates:

6.4.4.1 Vehicle rated pavement sections are to be designed by Contractor by use of the Geotechnical data presented in Appendix A.

6.4.4.2. Emergency Vehicle Access: Access drives are to be provided for in the design to allow access for fire trucks and emergency vehicles in accordance with NFPA and UFC 3-600-1. Access to the emergency drive(s) is restricted with AT/FP access control as designed in the Site Work Documents.

#### 6.4.5. Traffic Signage and Pavement Markings

Pavement markings and striping shall be designed and constructed in accordance with state DOT standards and the Manual of Uniform Traffic Control Devices (MUTCD). Channelization and pavement markings shall be designed and constructed by the Contractor as required by the FHWA MUTCD and FHWA Standard Highway Signs.

#### 6.4.6. Base Utility Information

[Not Supplied - PS\_SiteEngineering\_BaseUtility : SITE\_BASE]

Refer to Paragraph 6.9 for Site Base Electrical Utility Information.

The water distribution system tie in is shown on the Site Work Documents. The Contractor shall coordinate points of connection through the COR with American Water. Design and construction of the potable water service between the main line and the COF shall be the responsibility of the Contractor. The design and construction of the water distribution system for domestic water shall be in accordance with American Water's Design Guide and Specifications. A meter will be provided by the Contractor, and the Contractor will be responsible for connection to the meter and all service piping beyond the meter outlet. Design and installation of the water system and meter shall be in accordance with American Water's Design Guide, and shall be the contractor's responsibility to submit and get approval from LDHH, along with all associated fees. Coordination with American Water shall be through

the COR. Valves will be installed on the water service lines near the connection point and on each service line to the building. For water mains, provide 2 valves at tees and 3 valves at crosses. Velocities in water lines shall be less than 7 feet per second (fps) to prevent possible water hammer effects. Procedures for Submitting Plan and Specifications for Review and Approval of Water and Sewage Facilities can be found by using the links for American Water Design Guide found in Appendix MM.

a. Potable Water Disinfection - Verification of water line disinfection shall be performed per AWWA C651-05. The samples shall be analyzed by an analytical lab that holds a current state license and certification. Repeating disinfection protocols per AWWA C651-05 is required until satisfactory results are obtained (two consecutive sets of acceptable samples taken 24 hours apart). Water samples shall be collected in proper sterilized containers, and a bacterial examination shall be performed in accordance with state approved methods. As a minimum, one water sample from each 1000 linear feet segment of disinfected water line shall be collected. The water supply system disinfection is not approved for usage until each test result is negative for bacteriological examination. The water sample analytical results shall be provided to the DPW's Environmental Office for record keeping. The commercial laboratory shall be certified by the state's approving authority for examination of potable water.

Ft Polk preferences for back flow prevention can be found in Appendix EE and FF.

b. The Contractor shall provide one separate fire sprinkler service connection. The Contractor shall provide a double detector check valve assembly and all piping between the detector check and the building. The Contractor shall provide and locate fire hydrants in accordance with UFC 3-600-01 and American Water's Design Guide. The Contractor shall provide shutoff valves for each fire hydrant. The Contractor shall provide bollards around fire hydrants, Fire Department Connections (FDC), and Post Indicator Valves (PIV) that are subject to vehicular damage. The bollards shall be spaced to allow access by fire department personnel. The Contractor shall provide tamper switches with each PIV and shall connect the PIV to the building's fire alarm panel. Fire Department Connections shall be placed in front of the building and the PIV shall be placed a minimum of 40 feet away from all buildings. Any deviation from these locations must be approved in writing by the Fort Polk Fire Marshall and American Water.

The sanitary sewer system is shown on the SITE WORK DOCUMENTS (Appendix JJ). (AM#2) Any existing sewer lines under construction proposed by DB contractor shall be designed & replaced as a new sewer line. (AM#2) The Contractor shall coordinate points of connection through the COR with American Water. Design and construction of the sanitary sewer system shall be in accordance American Water's Design Guide and Specifications. The design and construction shall also be in accordance with American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF), Gravity Sanitary Sewer Design and Construction, Second Edition (ASCE Manuals and Reports on Engineering Practice No. 60 / WEF Manual of Practice No. FD-5). The Contractor shall be responsible for the installation of two-way cleanouts and all structures required by criteria, as well as, all piping between the designated point of connection and the building. Manholes shall be provided at every change of direction and every 400 feet. Provide drop manholes if pipe elevations differ more than 18 inches. The minimum sewer main size shall be 8-inch. Provide 6-inch minimum sewer connections to buildings. Provide two-way cleanouts every 100 feet along a sewer branch connection from a building, and provide two-way cleanouts at the building connection. Manhole inlets shall be constructed of reinforced concrete or pre-cast reinforced concrete. Structures in pavement shall be designed to handle HS-20 loading. The Contractor shall refer to American Water's Design Guide and Specifications to determine type of pipe material. The Contractor shall provide profiles for the underground sanitary sewer systems. Procedures for Submitting Plan and Specifications for Review and Approval of Water and Sewage Facilities can be found by following the links in Appendix MM for American Water Design Guidance.

Natural Gas distribution lines are shown in the Site Work Documents. The Contractor shall coordinate points of connection to the facility with the Fort Polk DPW through the COR. The Contractor shall install the site gas distribution piping. The Contractor shall provide and install the gas meter and connect the meter to the building stub out. Fort Polk uses a Sonix 880 meter or equivalent. The Contractor shall be required to stub the gas feed out of the building. Design and construction of the natural gas service lines shall be in accordance with ANSI B31.8, Gas Transmission Distribution and Piping Systems. Natural gas shall be provided to the building. A meter/regulator assembly shall be provided for the facility by the Contractor and shall have a valved bypass. Ft Polk Preferences for Gas Metering can be found in Appendix DD.

Refer to Paragraph 6.9 for Site Base Cable TV Utility.

#### 6.4.7. Cut and Fill

Clearing and Grubbing, rough and final grading of the building sites, building pad as well as all other areas shall be designed and provided for by the contractor.

#### 6.4.8. Borrow Material

Borrow sources do not exist on this installation.

#### 6.4.9. Haul Routes and Staging Areas

Permissible haul routes are shown in the Site Work Documents.

#### 6.4.10. Clearing and Grubbing:

Refer to Paragraph 5.1.2.5.

#### 6.4.11. Landscaping:

Plant material shall include low maintenance, drought tolerant plantings for screening views from roads and other highly visible areas. Landscaping shall also comply with AT/FP and LEED Silver requirements. Minimal landscaping and final erosion control features shall be provided. No permanent landscape irrigation shall be included in the project. Refer to Appendix I for a list of acceptable plants. All landscaping within 33 feet of the facility shall adhere to force protection clear zone requirements as specified in UFC 4-010-01.

#### 6.4.12. Turf:

Turfing shall be required on all graded, unpaved and disturbed areas resulting from the Contractor's operations. Sod shall be used in areas with steep slopes ( $\geq 3:1$ ) or ditch linings to assist in establishing turf and to aid in erosion protection. Turf Reinforcement Matting (TRM) should be used in ditches that are subject to high velocity storm runoff. Erosion control matting shall also be utilized as necessary to control erosion on steeper slopes. No permanent irrigation shall be included in the project.

### 6.5. ARCHITECTURE

6.5.1. General: To the maximum extent possible within the contract cost limitation, the buildings shall conform to the look and feel of the architectural style and shall use the same colors as adjacent facilities as expressed herein and shall conform with the Fort Polk's Real Property Master Plan. The Government will evaluate the extent to which the proposal is compatible with the architectural theme expressed in the RFP during the contract or task order competition. The first priority in order of importance is that the design provides comparable building mass, size, height, and configuration compared to the architectural theme expressed herein. The second priority is that design is providing compatible exterior skin appearance based upon façade, architectural character (period or style), exterior detailing, matching nearby and installation material/color pallets, as described herein.

#### 6.5.2. Design

6.5.2.1. Appendix F is provided "For Information Only", to establish the desired site and architectural themes for the area. Appendix F identifies the desired project look and feel based on Fort Polk's Installation Architectural Theme from existing and proposed adjacent building forms; i.e. building exterior skin, roof lines, delineation of entrances, proportions of fenestration in relation to elevations, shade and shadow effects, materials, textures, exterior color schemes, and organizational layout.

6.5.2.2. The design should address Fort Polk's identified preferences. Implement these preferences considering the following:

- (a) Achievable within the Construction Contract Cost Limitation (CCL)
- (b) Meets Milestones within Maximum Performance Duration.
- (c) Achieves Full Scope identified in this Solicitation
- (d) Best Life-Cycle Cost Design



- (e) Meets the Specified Sustainable Design and LEED requirements
- (f) Complies with Energy Conservation Requirements Specified in this RFP.

6.5.2.3. Priority #1. Visual Compatibility: Facility Massing (Size, Height, Spacing, Architectural Theme, etc.)

Exterior Aesthetic Considerations: The buildings massing, exterior functional aesthetics, and character shall create a comprehensive and harmonious blend of design features that are sympathetic to the style and context of the Installation. The Installation's intent for this area is:

(a) The Owners preference is that the 115 Hospital Company Operations Facility (COF) be architecturally compatible (aesthetics, colors and materials) with and incorporate elements of the new Tactical Vehicle Maintenance Facility (TEMF) being constructed on the adjacent site. Drawings of the new TEMF's architectural styles are provided in Appendix F.

(b). The Owners preference is that the Company Operations Facility comply with the requirements of the Ft Polk Post Installation Design Guide providing this is within budgetary constraints.

6.5.2.4. Priority #2. Architectural Compatibility: Exterior Design Elements (Materials, Style, Construction Details, etc.) Roofs, Exterior Skin, and Windows & Door Fenestrations should promote a visually appealing compatibility with the desired character while not sacrificing the integrity and technical competency of building systems.

6.5.2.5. See Appendix F for exterior colors that apply to Architectural character at Fort Polk. The manufacturers and materials referenced are intended to establish color only, and are not intended to limit manufacturers and material selections.

6.5.2.6. Additional architectural requirements:

(a) Install fall protection anchor points on all roofs with a slope greater than 2:12

(b) The exterior building appearance and aesthetics should attempt to be compatible with the new TEMF being constructed next to the COF on the adjacent corner site. The Elevation drawings shown in Appendix J are for reference only and represent the Owner's preferences for the aesthetics of this project. Design quality is achieved through the integration of buildings with the site, sustainability, selection of building systems for low-cost maintenance and operation, and an overall balance of aesthetics and functionality. Innovative, creative, or cost-saving proposals, which meet or exceed these requirements, are encouraged. The 115 Hospital COF utilizes two 150 person Readiness Modules which is a standard floor plan layout per the COE Centers of Standardization COF standards as required in this RFP. See a preliminary floor plan for the Standard two Company COF in Appendix J.

(c) Prevention of excessive wear and vandalism will be considered during the design of the Company Operations Facilities. Attention should be given to: doors, door hardware and assemblies, gypsum wallboard, acoustic factors and interior building finishes.

(d) Corridors. Provide semi-recessed fire extinguisher cabinets to comply with applicable codes. Do not locate breaker panels in the corridors. With the exception of fire sprinkler heads, no piping, conduit or ductwork shall be exposed in corridors. Owner's preference is for wood chair rails in all corridors finished the same as wood doors of all Offices.

(e) Showers. If fiberglass, vinyl, resin or similar type shower pans are utilized, set in grout mortar bed.

(f) Janitor Closets. Provide a mop sink and a heavy duty shelf integral with the mop rack.

(g) Access to Mechanical, Electrical and Communications spaces shall be limited to authorized personnel through lockable doors. Size and locate rooms to allow equipment removal and maintenance. Locate exterior Mechanical, Electrical, Communications Equipment, Air intake and openings in exterior walls to comply with anti terrorism force protection standards in UFC 4-010-01.

6.5.2.7 Architectural Vernacular

The project requires the design and construction of a Company Operations Facilities (COF) based on the Savannah Corp of Engineers Centers of Standardization (CoS) model for COF. The Architectural style, color

scheme and materials of the Company Operations Facility should be selected to match and compliment the style of Fort Polk. The 115 Hospital COF should incorporate elements from TEMF being constructed on the adjacent site.

#### 6.5.2.7.1 Building Exterior

(a) The facilities will have a non-combustible roof covering that meets or exceeds Class 4 impact resistance rating when tested in accordance with UL 22 18.1. Permanently attached snow and ice guards shall be provided above entrances, pedestrian walkways, play areas and hardstand surfaces, where due to the roof layout; there is the potential for moisture runoff (snow, water or ice) at roof edges.

(b) For roof coverings with standing seam metal, provide the material with 22 gauge minimum steel panels that are textured, ribbed, or striated to minimize possibility of oil canning. Roof slopes should be as indicated on the drawings in Appendix J.

(c) If operable windows are provided, they shall be installed complete with insect screens.

(d) Exterior guard and stair railings shall be aluminum finish.

(e) Exterior Building Signage Each building shall have exterior signage permanently attached on two faces of the building indicating the assigned building number or address. Building number signage details and locations shall conform to the Installation Standards as indicated in Appendix H.

(f) Exterior finishes should comply with the Ft Polk Installation Design Guide (IDG) and be compatible with the materials being utilized in the TEMF project, see appendix F. The owner's preferences for materials to be used are as follows as long as they are within the budgetary constraints of the project:

(1) Provide durable materials, split face CMU, up to 10'-0" above the finish floor elevation to the underside of the roof soffit of the Administration Module..

(2) The wall system above the CMU should be a durable, easily maintained system with insulated metal panel system, EFIS or other durable material compatible with the system to be installed on the TEMF. The Finish material will be installed over exterior grade gypsum sheathing with a continuous air barrier system on steel studs. The studs, sheathing and air barrier needs to extend from below the finish floor to the underside of the roof decking. The successful D-B Contractor will submit samples of materials that are in the color and texture range of the materials desired. See Appendix J – Elevations with proposed materials and appearance of the COF.

(3) Roof system should be a sloped roof. Standing seam metal roof with a 4:12 pitch is the Owners preference for this project. The roof covering for Standing Seam Metal on a sloped roof shall meet or exceeds Class 4 impact resistance rating when tested in accordance with UL 2218.1. Roof shall be pre finished color. The color should be compatible with the roof color of the TEMF being constructed on the adjacent site, see Appendix F.

(4) Glass and Glazing shall be tinted consistent with glazing. .

(5) All windows shall be pre finished, blast proof that comply with AT/FP requirements for windows and window installation. The color shall match the proposed roof color. Provide screens for all operable windows.

(6) All doors and frames should be hollow metal construction. All doors and frames shall be painted to match the roof color.

(7) Provide building numbers for the 115 Hospital COF per the Ft Polk Installation Design Guide, reference TM 5-807-10. Three building numbers signs Type C-8, one primary facility sign type C3 perpendicular to the road, one primary entry sign type C5, and two secondary entry signs type C6,

#### 6.5.2.7.2 Building Interior

(a) As a minimum provide Moisture Resistant Gypsum Board (MR) on walls of all Toilet Rooms.

(b) Pre-decorated gypsum board panels and trim system or similar type products and assemblies are not permitted.

(c) Doors. The owner's preference is for all office doors to be wood doors constructed with solid core doors with hardwood veneer compatible in color to other interior finishes.

(d) Owner preference for all corridors, if within the budgetary constraints of this project, to have wood chair rails finished to match the doors of the offices.

#### 6.5.2.7.3 Unique Architectural Requirements:

(a) Arms Vaults for the COF's shall conform to AR 190-11 Appendix G. Arms vaults shall be provided with day gates with issue windows. Day gates may be either single leaf or split (Dutch) door type.

(b) Readiness Module separation walls (demising wall) between each Companies Bay space shall comply with AR 190-51, Risk Level II. Demising walls shall extend from floor to structure, with gaps between it and intersecting walls, ducts and other penetrations no greater than 4-inches. Chain link fencing shall not be used.

(c) Walls which are to be provided for the secure storage of equipment in the Readiness Module for the Unit Storage, **(AM#3)** NBS NBC/**(AM#3)** Storage and Communication Equipment Storage spaces shall either have walls that extend from floor to structure or shall be capped at a minimum height of 9'-0" with construction equal to or greater than the wall construction **(AM#3)** per AR190-51. SIPRnet rooms shall be designed with minimum wall construction of **(AM#3)** 3-5/8" metal studs with heavy duty 18 gage woven wire mesh screwed to the studs at 6" cc and a layer of 5/8" gypsum board on each side. Any wall construction with gaps between it and intersecting walls, ducts and other penetrations will be no greater than 4-inches. Chain link fencing shall not be used.

(d) Vending Machine Space. Provide space for vending machines as identified on the standard single COF floor plan.

(e) Mud Wash Utility Sinks as required in the Readiness Bays shall be constructed of stainless steel. Sink basins may be arranged in pairs. Each sinks basin shall be equal in size and a minimum of 24" square and 18" in depth.

(f) Insulation shall not be exposed on interior wall surfaces accessible to building occupants or maintenance personnel. As a minimum, wall surfaces from finished floor to a height of 8'-0" or 4" above finished ceilings as applicable, shall be provided with gypsum board or similar products that are durable and easy to maintain. Note that this also applies to wall surfaces on the mezzanine level. The walls of the Readiness module will be finished up to 8'-0" above the level of the Mezzanine floor throughout the entire Readiness bay to a height of approximately 20'-0" above the first floor locker area.

(g) Except as otherwise indicated, provide Impact Resistant Gypsum Board from T.O.S. to 8'-0" A.F.F. along walls of Corridors, Stairs, Conference Rooms, Training Rooms, Break Rooms, Storage Rooms, Supply Rooms, Vending Rooms and Recycle Rooms.

(h) Ceilings in the Readiness Module, Mechanical, Electrical, Communication and Janitor Closets may be exposed to structure. All other spaces shall be provided with either Acoustical Tile or Gypsum Board Ceilings. Appropriate consideration for moisture and other environmental factors associated with Ft Polk and the COF's should be taken into consideration in the design and selection of ceiling and wall finishes throughout this facilities. The SIPRNet Room will be provided with a hard gypsum board ceiling. As a minimum Moisture resistant (MR) ACT shall be provide for ceilings of Entry Vestibules, Toilets, Latrine and Shower Rooms, however MR Gypsum Board ceilings are preferred for these spaces.

(i) The COFs shall have a continuous air barrier system to be applied to all four exterior walls, the floor system and the roof/ceiling in both the Administration Module and the Readiness Module.

#### 6.5.2.7.4 Floor Plans

(a) See section 01 10 00, 3.3.9, standard COF floor plans, for additional COF building requirements. COF layouts shall conform to the requirements herein and the standard floor plans. Building layouts may be adjusted slightly to accommodate proposed construction materials and building systems. However, dimensions indicated herein and on the plans shall be considered as minimum requirements. Overall building footprints shall be sized to fit within the building site limits as indicated on the attached site plans.

(b) All Company Operations Facility (COF) buildings shall be designed and constructed with a detached covered Hardstand. The Hardstand Cover materials and appearance should be compatible with the COF.

#### 6.5.2.7.5 Natural Lighting

The Company Operations Facility buildings should incorporate natural day lighting (i.e. clearstory windows and/or skylights) into the design of the Readiness Bay area to the maximum extent possible.

#### 6.5.2.7.6 Adjacent Building Materials:

(a) The new COFs should utilize a similar color scheme and textures of material as the TEMF under construction on the adjacent site, see Appendix F elevations of the TEMF and the color pallet associated with that project.

(b) The Owner's preference is the use of split face CMU for the Administration Module and up to 10'-0" on the Readiness module, with Insulated metal panels from the top of the CMU to the roof and a standing seam metal roof system all to be compatible with the TEMF project.

#### 6.5.3. Programmable Electronic Key Card Access Systems:

##### 6.5.3.1 Electronic Card Reader Access Entry Control System

(a) No electronic key card access will be provided for this facility.

##### 6.5.3.2 Keyed Access Entry Control System

(a) Janitor Closets shall be provided with a keyed lockset.

(b) Lever handles are to be used per ADA.

(c) Provide a Knox Box, series 3200, as manufactured by Knox Company Phoenix, Arizona, at the main entrance to each building. Only one Knox Box is required per building. Knox box needs to be approximately 4"x4" and recessed into the wall.

(d) Latrine, Shower and Locker Rooms shall be provided with a dead bolt lock on the main entry door(s) into the space, so that the entire space can be closed off for maintenance or other access control purposes.

##### 6.5.3.3 Key And Final Core Control And Installation

(a) Where required, the construction contractor shall be responsible for installation of all locksets and exit devices for the project to be performed through the Authorized Representative of the Contracting Officer. This includes combination and installation of any required cores and key duplication. The core type and combination shall meet the requirements of the master key system on Fort Polk. To ensure this occurs, the post Operations and Maintenance (O&M) contractor locksmith shall have input on core combination and shall be contacted during the project design phase after Construction Contract award.

(b) To meet the Ft Polk master key plan, all keyed lockset devices shall be compatible with BEST lock cores. The type of core required will be dependent on the security requirement for the building and/or room. The O&M contractor locksmith will assist in determining the core type with input from Physical Security. POC, phone

(c) The construction contractor shall be responsible for installation of all permanent lock cores. Any coordination required with BEST Lock Company for installation of the cores shall be planned for and is the responsibility of the construction contractor.

(d) All cores shall include four for interior doors and five keys for exterior doors. All keys shall be stamped with "U.S. GOVERNMENT DO NOT DUPLICATE" and cores shall be stamped with the core number. All master keys provided shall be turned over to the O&M contractor locksmith for security control through the government Project Engineer. All other keys shall be inventoried and turned over to Facilities Utilization for issue to the building occupants through the government Project Engineer.

#### 6.5.4. INTERIOR DESIGN

##### 6.5.4.1 Structural Interior Design

6.5.4.1.1. Provide a sign on the exterior side of the mechanical room door that states "In Case of Emergency Call DPW Work Desk ". Coordinate sign size, font, material, installation method, etc. with DPW Office. Verify accuracy of telephone number with the COR prior to fabrication of sign. Sign construction to be intended for exterior installation.

6.5.4.1.2. In reference to 01 10 00 paragraph 5.3.5.6, also provide window treatment at interior windows where privacy is required for all company offices. In addition, window treatment to be horizontal blinds designed for use in commercial type buildings.

6.5.4.1.3. If provided, wood to be a medium range color.

6.5.4.1.4. If incorporated into the building color theme, including Furniture, Fixtures and Equipment (FF&E), limit blue to minor accents. Use of blue requires DPW and Corps of Engineers approval prior to submitting color boards for review.

6.5.4.1.5. Variation of color and/or floor patterns is desired to visually shorten long corridors and add interest.

6.5.4.1.6. Coordinate type of luster for VCT floor polish with the Authorized Representative of the Contracting Officer.

6.5.4.1.7. In addition to color guidance provided in Section 01 10 00, paragraph 5.3.5.3, provide finish color and pattern selections that help hide soiling. Examples of soiling include, but are not limited to:

- \* boot marks and tracked in dirt on floors

- \* marks and fingerprints on doors and door frames, systems furniture panels, overheads and tack boards

6.5.4.1.8. Consider building maintenance, functionality and future flexibility when designing the building interior.

6.5.4.1.9. Do not provide carpet borders or solid colors.

##### 6.5.4.2. FF&E Design

6.5.4.2.1. Notwithstanding provisions in other sections of the RFP that state the furniture procurement is not included in this contract; the Government reserves the right to change the method for procurement of and installation of furniture to Contractor Furnished/Contractor Installed (CF/CI). CF/CI furniture will require competitive open market procurement by the Contractor using the Furniture, Fixtures and Equipment (FF&E) package.

6.5.4.2.1.1. The Contractor is responsible for fully developing all furniture requirements per their design. Coordinate with the Contracting Officer Representative (COR) during the Design After Award stage; refer to Section 01 33 16 Attachment B of the RFP.

6.5.4.2.1.2. Specify furniture from the GSA Schedules. Furniture available open market may be specified when an item is not available on the GSA Schedules. Provide justification stating that item was not available on the GSA Schedules. This requires research and documentation to prove the item is not available on the GSA schedules.

6.5.4.2.1.3. Provide a design for a functional facility that is intended for commercial use.

6.5.4.2.1.4. Coordinate layout with building design and connections to assure that locations of electrical outlets, switches, J-boxes, communication outlets and lighting are appropriate. In addition, coordinate layout with other building features such as architectural elements, thermostats, location of TV's, GF/GI equipment (for example computers, printers, copiers, shredders, faxes), etc. If project has SIPRNET, furniture layout to be coordinated with SIPRNET locations; verify that access required by the NEC for SIPRNET box and conduit is provided.

6.5.4.2.1.5. Provide locations for government furnished/government installed faxes, printers, and copiers.

- 6.5.4.2.1.6. Do not provide recycle bins in recycle rooms.
- 6.5.4.2.1.7. Do not include artwork, artificial plants or clocks in FF&E.
- 6.5.4.2.2. General Furniture Requirements:
  - 6.5.4.2.2.1. The word "provide" when used in this section applies to the furniture design.
  - 6.5.4.2.2.2. Provide furniture that complies with ANSI/BIFMA.
  - 6.5.4.2.2.3. Provide furniture from manufacturer's standard product line as shown in the most recent published price list and or amendment and not custom product.
  - 6.5.4.2.2.4. Provide furniture that is appropriate for adults not children, unless otherwise noted.
  - 6.5.4.2.2.5. Provide user friendly features such as radius edges. Do not use sharp edges and exposed connections.
  - 6.5.4.2.2.6. Provide concealed clips, screws, and other construction elements when possible.
  - 6.5.4.2.2.7. Provide abutting work surfaces that mate closely and are of equal heights when used in side-by-side configurations in order to provide a continuous and level work surface.
  - 6.5.4.2.2.8. Provide underside of desks, tables and worksurfaces that are completely and smoothly finished.
  - 6.5.4.2.2.9. Provide kneespace at workstations and tables that is not obstructed by panels/legs that interfere with kneespace of seated person.
  - 6.5.4.2.2.10. Provide desks, storage and tables with leveling devices to compensate for uneven floors.
  - 6.5.4.2.2.11. Provide workstations with stable keyboard trays that have height adjustability, tilting capability, including negative tilt, have a mouse pad at same height as keyboard tray that can accommodate both left and right handed users and retractable under worksurface. Location of keyboard tray to be functional.
  - 6.5.4.2.2.12. Provide task lighting and tack surfaces at workstations with overhead storage.
  - 6.5.4.2.2.13. Provide workstation pedestal drawers that stay securely closed when in the closed position. Each drawer contains a safety catch to prevent accidental removal when fully open.
  - 6.5.4.2.2.14. Locate furniture in front of windows only if the top of the item falls below the window.
  - 6.5.4.2.2.15. Provide lockable desks and workstations, filing cabinets and storage.
  - 6.5.4.2.2.16. Provide storage for office supplies.
  - 6.5.4.2.2.17. Provide furniture as required in offices to locate and support faxes, printers, etc.
  - 6.5.4.2.2.18. Provide all accessories required for completely finished furniture installation.
  - 6.5.4.2.2.19. Unless otherwise noted, do not attach furniture including furniture systems to the building.
- 6.5.4.2.3. Standard Office Furniture:
  - 6.5.4.2.3.1. Provide standard office furniture including casegoods, tables, storage, seating, etc. that is compatible in style, finish and color.
  - 6.5.4.2.3.2. Provide casegoods and storage of steel construction.
  - 6.5.4.2.3.3. Provide grommets and wire management requirements where appropriate.

6.5.4.2.3.4. Provide desk pedestal design that protects wires from damage during drawer operation.

6.5.4.2.3.5. Provide worksurface tops constructed to prevent warpage. Provide finish intended for horizontal surfaces.

6.5.4.2.4. Standard Office Desk Chairs and Guest Chairs:

6.5.4.2.4.1. Provide ergonomic desk chairs with casters, non-upholstered adjustable arms, waterfall front, swivel, tilt, variable back lock, adjustable back height or adjustable lumbar support, pneumatic seat height adjustment, and padded, contoured upholstered seat and back, unless otherwise noted.

6.5.4.2.4.2. Provide desk chairs with adjustable seat height range of 4 1/2", range to include 16 1/2-20".

6.5.4.2.4.3. Recommend that desk chairs have a black frame and fabric.

6.5.4.2.4.4. Provide guest chairs that are compatible in style, finish and color with the desk chairs.

6.5.4.2.5. Conference Chairs:

6.5.4.2.5.1. At tables, provide ergonomic conference seating with casters, non-upholstered arms, waterfall front, swivel, tilt, pneumatic seat height adjustment, and padded, contoured seat and back, unless otherwise noted. Provide arm height and/or design that allow seating to be moved up closely to the table top.

6.5.4.2.5.2. Provide perimeter conference chairs that are compatible in style, finish and color with conference seating at the tables.

6.5.4.2.6. Lounge and Reception Type Furniture:

6.5.4.2.7. General Seating:

6.5.4.2.7.1. Desk, guest and conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable.

6.5.4.2.7.2. Provide appropriate chair casters and glides for the floor finish where the seating is located. Universal casters that are appropriate for both hard surface flooring and carpet are preferred.

6.5.4.2.7.3. Provide seating that supports up to a minimum of 250 lbs.

6.5.4.2.7. Filing and Storage:

6.5.4.2.7.1. Provide counterweights for filing cabinets when required by the manufacturer for stability.

6.5.4.2.7.2. Provide file drawers that allow only one drawer to be opened at a time.

6.5.4.2.7.3. Provide storage and shelving units that meet customers functional load requirements for stored items. Contractor is to provide heavy duty storage and shelving if information is not available.

6.5.4.2.8. Tables:

6.5.4.2.8.1. Provide plastic laminate table tops constructed to prevent warpage. Provide finish intended for horizontal surfaces. Don't provide plastic laminate self edge.

6.5.4.2.9. Additional Facility FF & E Unique Furniture Requirements: Not Applicable

6.5.4.2.10. Furniture Warranties. Provide manufacturer's performance guarantees or warranties that include parts, labor and transportation as follows, unless otherwise noted:

Furniture System, unless otherwise noted – 10 year minimum

Furniture System Task Lights – 2 year minimum, excluding bulbs

Furniture System Fabric – 3 year minimum

Desks - 10 year minimum

Seating, unless otherwise noted - 10 year minimum

Seating Mechanisms and Pneumatic Cylinders - 10 years

Fabric - 3 years minimum

Filing and Storage - 10 year minimum

Tables, unless otherwise noted - 10 year minimum

Table Mechanisms – 5 year

Table Ganging Device - 1 year

Items not listed above - 1 year minimum

If manufacturer's standard performance guarantees or warranties exceed the minimum requirements listed above provide that guarantee or warranty.

#### 6.5.4.2.11. Upholstery and Finishes:

6.5.4.2.11.1. Provide upholstery that meets Wyzenbeek Abrasion Test, 55,000 minimum rubs.

6.5.4.2.11.2. Provide easily cleanable upholstery and finishes in heavy use areas.

6.5.4.2.11.3. Utilize manufacturer's standard fabrics; this includes textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule.

6.5.4.2.11.4. Provide finishes that can be cleaned with ordinary household cleaning solutions.

6.5.4.2.11.5. Provide upholstery and finish colors and patterns that help hide soiling.

6.5.4.2.11.6. Provide desk worksurfaces and table tops that are neutral in color, not too light or too dark in color and have a pattern to help hide soiling. The exception is break areas; they are not limited to neutral colors.

6.5.4.2.12. Further coordination is required with the Contracting Officer Representative (COR) during Design After Award stage for the following:

(a) Filing requirements such as hanging file or compressor divider type; letter or legal files

(b) Workstation filing and storage requirements; are mobile pedestals required; is an upholstered seat cushion necessary on mobile pedestal. (c) General filing and storage requirements not located in workstations

(d) Desk chair requirements such as adjustable arms, adjustable back height, and seat pan forward and back adjustment to increase or decrease depth of seat pan

(e) Seating requirements such as adjustments, chair with glides or casters, other necessary features, etc.

(f) Lock and keying requirements; is storage in desks and workstations to be keyed alike or differently, etc.; at a minimum provide 2 keys per workstation when keyed alike and 2 keys for other lockable office storage items

(g) Table requirements such as four legs, pedestal, foldable, nesting, mobile on casters, etc.; are dollies required.



Interior building signage requirements:

Interior building signage requirements:

In reference to 01 10 00 paragraph 5.3.5.5, provide interior signage that conforms to UFC 3-120-01 Air Force Sign

Standards (applies to Army projects). Coordinate all signage requirements, including message content, room numbering, and placement with User and COR. Consider UNICOR System 2/90 signage as a good basis of design. Provide signage for all rooms, unless otherwise noted or directed by the Contracting Officer.

## 6.6. STRUCTURAL DESIGN

### 6.6.1 General:

(a) Consider mission effectiveness, the most economical system in the locality, life-cycle economics, and space adaptability in choosing the structural systems. Provide an open layout out to allow future space adaptability including future reorganization or reallocation of space. Internal load bearing structures shall be limited.

(b) Analyze, design, and detail as a complete structural system. Design structural elements to preclude damage to finishes, partitions and other fragile, non-structural elements; to prevent impaired operability to moveable components; and to prevent cladding leakage and roof ponding. Limit deflections of structural members to the allowable limits of the IBC when no other more stringent restrictions exist, such as applicable material standards, manufacturer's product recommendations or detailing limitations.

(c) Consider climate conditions, high humidity and other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coating on structural members, expansion joints, the level corrosion protection, and the structural systems. All concrete shall have a minimum strength of 3000 PSI and shall be steel reinforced. The minimum concrete compressive strength of floors subjected to pneumatic tired traffic shall be 4000psi. Slab on grade shall be a minimum of 4" thick. Mechanical and electrical equipment shall be on a poured in place concrete pad. The concrete pad shall be a minimum of 4" thick. **(AM#3)** Provide Termite protection under the entire concrete slab in accordance with Appendix AA of the RFP. **(/AM#3)**

(d) In addition to the basic loading criteria (gravity, wind, seismic and snow), building ancillary building items, e.g. doors, windows jambs and connections, overhead architectural features, equipment bracing shall be design following the requirements or UFC 4010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but not limited to, the following items under the loads prescribed in UFC 4-010-01;

(1) Supporting members of glazed elements, e.g. window jamb, sill, header

(2) Connections to glazed elements to supporting members, e.g. window to header

(3) Connections of supporting members to each other, e.g. header to jamb

(4) Connections to supporting members to structural system, e.g. jamb to foundation.

### 6.6.2 Applicable Standards, Codes, and Criteria:

The structural design shall fully comply with the following listed criteria in addition to the provisions provided in Section 01 10 00 paragraph 4.0 Applicable Criteria.

#### (1) General Standards:

The following information from the Unified Facilities Criteria (UFC) shall be used as the building design criteria:

(a) UFC 3-301-01, Structural Engineering, latest edition

Table 2-1, Table 2-2, Table D-1 Table E-1 and Table E-2

(b) Occupancy Category:

Per UFC 3-310-01 Table 2-2 and ASCE 7 the occupancy category shall be II.

6.6.3 Material Properties:

(1) Concrete:

(a) Concrete: Minimum 28-day compressive strength shall be  $f'_c = 4,000$  psi for the elevated slabs. Minimum 28-day compressive strength shall be  $f'_c = 3,000$  psi for all other concrete work which includes a ribbed slab.

(b) Reinforcing steel: ASTM A615, Grade 60 and 40, deformed.

(c) Welded wire fabric: ASTM A185.

(2) Metals:

(a) Structural Steel Wide flange members shall be ASTM A992, Grade 50.

(b) Structural Steel Shapes (angles, channels, etc) and plates shall be minimum ASTM A36, Grade 36.

(c) Hollow structural steel sections shall be ASTM A500, Grade B. Round HSS shall be minimum 42 ksi, and rectangular HSS shall be minimum 46 ksi.

(d) Pipe shall be ASTM A53, Grade B, minimum 35 ksi.

(e) Steel Deck shall be ASTM A653, minimum 33 ksi

6.6.4 Arms Vault:

The arms vaults shall be designed per and comply with the requirements of AR 190-11, Appendix G.

6.6.5 Deflection/ Drift Criteria:

(1) Roof and floor framing members supporting ceilings shall have deflections limited to 1/360 for live load and 1/240 for dead plus live load in rooms with brittle ceiling materials.

(2) Seismic- and wind-related deflections and drifts shall be designed for and held below prescribed maximums.

(3) Individual metal plumbness shall be per the applicable code's (e.g. AISC Manual of Steel Construction) standard mill practices. Modules shall not arrive to the site out of plumb by more than a horizontal distance of  $L/180$  where L is the vertical length of the posts/columns (in inches).

6.6.6 Project Specific Design Loads:

(1) Load Combination:

Load combinations shall be per the International Building Code.

(2) Dead Loads:

Minimum dead loads are in accordance with International Building Code. Dead loads shall include the weight of all permanent materials and equipment supported in or on a structure, including the structure's own weight.

(3) Live Loads:

Minimum live loads shall be in accordance with International Building Code and UFC 3-310-01, Table D-1 but not lower than the following minimum loads or the load requirement of the user:

- (a) First Floor/ Slab-on-Grade: Shall support a minimum uniform load of 150 psf (unless noted otherwise). At a warehouse condition the slab-on-grade shall support the more stringent of a 300 psf uniform load or a forklift with a capacity of 6000 pounds.
- (b) Elevated Floor: Shall support a minimum uniform load of 80 psf. The live shall include the load from the partitions.
- (c) Storage (light)/ Supply: Shall support a minimum uniform load of 125 psf or actual equipment load, whichever is greater.
- (d) Equipment / Mechanical Room: Shall support a minimum uniform load of 125 psf or actual equipment load, whichever is greater.
- (e) Roof: Minimum live load of 20 psf or Snow Load, whichever is greater. In addition to uniform load, primary roof members, exposed to work floor, shall have a single point load of 2000 pounds at the Readiness building only. The load shall be supported at a single panel point on the lower chord of roof trusses or any point along the primary members supporting the roof.

(4) Wind Loads:

Wind Speed,  $V$ , is 95 MPH per UFC 3-310-01, Table E-1. Design wind loads shall be calculated per ASCE 7 for both the main wind-force resisting system and for components and cladding. Wind importance factor ( $I_w$ ) shall be a minimum of 1.0.

(5) Seismic Loads:

Design seismic loads shall be calculated per ASCE 7 and the following criteria:

- (a) The following seismic accelerations apply per UFC 3-310-01, Table E-2:  $S_s = 0.12$ ,  $S_1 = 0.05$ .
- (b) Site class shall be verified upon completion of the Geotechnical Report.
- (c) Seismic importance factor ( $I_e$ ) shall be a minimum of 1.0.

(6) Snow Loads:

Minimum ground snow load,  $p_g$ , is 5 PSF per UFC 3-310-01, Table E-1. Drifting snow and unbalanced snow loading shall be per ASCE 7. Snow importance factor ( $I_s$ ) shall be a minimum of 1.0.

(7) Lateral Partition Loads:

All interior surfaces shall be designed to support a pressure of 5 PSF as a minimum.

6.6.7 Foundation:

Contractor shall design the foundations in accordance with the Geotechnical Report found in Appendix A.

6.7. THERMAL PERFORMANCE

No Additional Requirements.

6.8. PLUMBING

Provide shut-off valves to all sinks, toilets, water heaters, and/or any water tie-ins connections (hot and cold).

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

The Electrical Site Plan shows a point of connection to a 13.8 kV overhead electrical line running parallel and east of Texas Avenue. Lines are maintained by the Post, and coordination should be made by the contractor through

the COR a minimum of two weeks in advance of proposed construction. **(AM#3)** Overhead primary line serving site is 4 #477 kcmil ASCR conductors on 45 foot wood poles. Transformer secondary voltage can be either 480Y/277V or 208Y/120V as determined by secondary load size. Secondary service from transformer building to electrical room shall be 3-1/C, copper, EPR, 133% insulation conductor in concrete encased PVC schedule 40 conduit. Minimum size of underground conductor shall be 125% of transformer rated primary amperes. **(/AM#3)**

Additional Site Electrical considerations: See Site Work Documents Electrical Site Plan for more information on Electric Vehicle Charging Station. A link in Appendix MM has been provided under Electric Vehicle Charging Station for design basis.

Contractor to tie into and pull new communication lines (Copper and Fiber) in existing conduits as required from Manhole T22 to MHT24. Contractor to construct new 4~4" Conduit duct bank sytem and communication lines from MH T24 to the building to complete the connection.

#### 6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

No Additonal Facility Electrical and Telecommunications.

#### 6.11. HEATING, VENTILATING, AND AIR CONDITIONING

Particular attention must be provided in design to the high humidity, moisture, mildew and mold potential of this region.

#### 6.12. ENERGY CONSERVATION

##### 6.12.1. General

[Not Supplied - PS\_EnergyConservation : ENERGY\_CONSERVATION]

6.12.2. Inclusion of Renewable Energy Features. The following renewable energy features have been determined lifecycle cost effective, are included in the project budget and shall be provided:

[Not Supplied - PS\_EnergyConservation : RENEWABLE\_ENERGY\_FEATURES]

#### 6.13. FIRE PROTECTION

The system shall tie to the Installation Fire Department via FM radio transmission.

6.13.1 Fire alarm panel shall be located in the mechanical room.

6. 13.2 Alarm signals transmitted shall be zoned per floor.

6.13.3 Antenna shall be omni-directional type.

6.13.4 Provide Class A fire alarm circuits. Common speakers shall be used for fire alarm (FA) and mass notification (MN) messages. Smoke detectors shall transmit supervisory, trouble, and alarm signals to the fire alarm control panel (FACP) per the Installation's DPW.

6.13.5 All IDC, SLC, and NAC circuits shall be class A style D, class A style 6, and class A style Z.

6.13.6 FA signals and MN messages shall be transmitted via a Monaco BT -FM transceiver (or approved equal) to the Monaco D-21 proprietary supervising station receiving equipment.

6.13.7 Provide an 80-character display annunciator, with message buffer, at both the FACP and the fire department building entry. Also, provide a graphic display annunciator at the building entry. The graphic display should be an architectural display of the building set. The graphic display shall have LED lights that flash, representing signals sent by the transmitter.

6.13.8 Base currently utilizes FS-250 by Siemens or 7100 by FCI fire control panels for existing structures.

Mass Notification System shall be capable of accepting controls to announce app pre-recorded messages as well as live messages from a remote site by way of dry contacts and 600 ohm audio inputs.

#### 6.14. SUSTAINABLE DESIGN

6.14.1. LEED Rating Tool Version. This project shall be executed using LEED-NC Version 2.2.

6.14.2. The minimum requirement for this project is to achieve LEED Silver level. Each non-exempt facility (building plus sitework) must achieve this level. In addition to any facilities indicated as exempt in paragraph 3, the following facilities are exempt from the minimum LEED achievement requirement: NONE..

6.14.3. Credit Validation: LEED registration, compiling of documentation at LEED OnLine and use of the LEED Letter Templates is required. Registration and payment of registration fees will be by the Government. Administration/team management of the online project will be by the Contractor. Validation of credits will be accomplished by the Government. LEED certification of the project by the Contractor is not required. The Government may choose to seek LEED certification of the project, in which case the Government will pay certification fees and coordinate with the GBCI and the Contractor will furnish audit data as requested at no additional cost.

6.14.4. Commissioning: See Appendix M for Owner's Project Requirements document(s).

6.14.5. LEED Credits Coordination. The following information is provided relative to Sustainable Sites and other credits.

#### **SS Credit 1 Site Selection:**

Project site IS NOT considered prime farmland.

Project site is five feet or more above 100-year flood elevation.

Project site contains no habitat for threatened or endangered species.

No portion of project site lies within 100 feet of any water, wetlands or areas of special concern.

Project site WAS NOT previously used as public parkland.

#### **SS Credit 2 Development Density & Community Connectivity.**

Project site DOES NOT meets the criteria for this credit.

#### **SS Credit 3 Brownfield Redevelopment.**

Project site DOES NOT meets the criteria for this credit.

#### **SS Credit 4.1 Public Transportation Access.**

Project site DOES NOT meets the criteria for this credit.

#### **EA Credit 6 Green Power.**

35% of the project's electricity WILL NOT will be provided through an Installation renewable energy contract. Do not purchase Renewable Energy Credits (REC's) to earn this credit.

#### **MR Credit 2 Construction Waste Management.**

The Installation does not have an on-post recycling facility available for Contractor's use.

6.14.6. LEED Credit Preferences, Guidance and Resources. See Appendix L LEED Project Credit Guidance for supplemental information relating to individual credits.

6.14.7. Not Used

6.14.8. Additional Information

[Not Supplied - PS\_SustDesign\_Additional : MR2]

#### 6.15. ENVIRONMENTAL

The Contractor must have two Fort Polk certified Environmental Compliance Officer's onsite. The training is forty (40) hours and is offered weekly on Post. Coordinate the dates of training with the COR.

#### 6.16. PERMITS

A SWPPP is required as indicated in this RFP and approval is required by LDH&H; the contractor shall coordinate this requirement through the COR.

A Fort Polk Utility Location and Dig Permit is required and shall be coordinated through the COR; an example form can be found in Appendix BB.

#### 6.17. DEMOLITION

Pavement, utilities, flat work, trees, stumps, roots, etc... to be removed according to Demolition Site Plan and final Layout to be designed by contractor.

#### 6.18. ADDITIONAL FACILITIES

[Not Supplied - PS\_AdditionalFacilities : ADDITIONAL\_FACILITIES]

End of Section 01 10 00.W912HN-07-X-9316

**SECTION 01 32 01.00 10**  
**PROJECT SCHEDULE**

**1.0 GENERAL**

1.1. REFERENCES

1.2. QUALIFICATION

**2.0 PRODUCTS (NOT APPLICABLE)**

**3.0 EXECUTION**

3.1. GENERAL REQUIREMENTS

3.2. BASIS FOR PAYMENT AND COST LOADING

3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

3.4. PROJECT SCHEDULE SUBMISSIONS

3.5. SUBMISSION REQUIREMENTS

3.6. PERIODIC SCHEDULE UPDATE MEETINGS

3.7. REQUESTS FOR TIME EXTENSIONS

3.8. DIRECTED CHANGES

3.9. WEEKLY PROGRESS MEETINGS

3.10. OWNERSHIP OF FLOAT

3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

## **1.0 GENERAL**

### **1.1. REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- U.S. ARMY CORPS OF ENGINEERS (USACE) ER 1-1-11 (1995) Progress, Schedules, and Network Analysis Systems <http://www.usace.army.mil/publications/eng-regs/er1-1-11/entire.pdf>

### **1.2. QUALIFICATIONS**

Designate an authorized representative who shall be responsible for the preparation of the schedule and all required updating (statusing) and preparation of reports. The authorized representative shall be experienced in scheduling projects similar in nature to this project and shall be experienced in the use of the scheduling software that meets the requirements of this specification.

## **2.0 PRODUCTS (Not Applicable)**

## **3.0 EXECUTION**

### **3.1. GENERAL REQUIREMENTS**

3.1.1. Submit a project schedule as specified herein for approval showing the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences is required. Contractor management personnel shall actively participate in its development. Designers, subcontractors and suppliers working on the project shall also contribute in developing an accurate project schedule. The schedule must be a forward planning as well as a project monitoring tool. The approved project schedule shall be used to measure the progress of the work and to aid in evaluating requests for excusable time extensions. The schedule shall be cost loaded and activity coded as specified herein. The schedule will provide the basis for all progress payments. If the Contractor fails to submit any schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule

3.1.2. Status the schedule on at least a monthly basis, as specified herein. If in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained. See paragraph 3.7.4.

3.1.3. Failure of the Contractor to comply with the requirements of the Contracting Officer shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract.

### **3.2. BASIS FOR PAYMENT AND COST LOADING**

The schedule shall be the basis for determining contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update or qualified scheduling personnel will result in an inability of the Contracting Officer to evaluate contract earned value for the purposes of payment. Failure of the Contractor to provide all information, as specified herein will result in the disapproval of the preliminary, initial and subsequent schedule updates. In the event schedule revisions are directed by the Contracting Officer and those revisions have not been included in subsequent revisions or updates, the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until such revisions to the project schedule have been made. Activity cost loading shall be reasonable as determined by the Contracting Officer. The aggregate value of all activities coded to a contract CLIN as specified herein shall equal the value of the CLIN on the Schedule.



### 3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

The computer software system utilized to produce and update the project schedule shall be capable of meeting all requirements of this specification. Failure of the Contractor to meet the requirements of this specification will result in the disapproval of the schedule. Scheduling software that meets the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER-1-1-11(1995) referenced herein are Primavera Project Planner (P3) by Primavera, and Open Plan by Deltek.

#### 3.3.1. Use of the Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the project schedule. Prepare the project schedule using the Precedence Diagram Method (PDM).

#### 3.3.2. Level of Detail Required

Develop the project schedule to an appropriate level of detail. Failure to develop the project schedule to an appropriate level of detail, as determined by the Contracting Officer, will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

##### 3.3.2.1. Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days. Procurement activities are defined herein.

##### 3.3.2.2. Design and Permit Activities

Include design and permit activities, including necessary conferences and follow-up actions and design package submission activities. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. This shall be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Include review and correction periods associated with each item.

##### 3.3.2.3. Procurement Activities

Include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days. A typical procurement sequence includes the string of activities: submit, approve/review, procure, fabricate, and deliver.

##### 3.3.2.4. Mandatory Tasks

Include and properly schedule the following tasks (See also the Sample Preliminary Submittal Register Input Form):

- 3.3.2.4.1. Submission, review and acceptance of design packages, including BIM
- 3.3.2.4.2. Submission of mechanical/electrical/information systems layout drawings
- 3.3.2.4.3. Submission and approval of O & M manuals
- 3.3.2.4.4. Submission and approval of as-built drawings
- 3.3.2.4.5. Submission and approval of 1354 data and installed equipment lists
- 3.3.2.4.6. Submission and approval of testing and air balance (TAB)
- 3.3.2.4.7. Submission of TAB specialist design review report

3.3.2.4.8. Submission and approval of fire protection specialist

3.3.2.4.9. Submission and approval of testing and balancing of HVAC plus commissioning plans and data. Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with the contract commissioning requirements.

3.3.2.4.10. Air and water balancing

3.3.2.4.11. HVAC commissioning

3.3.2.4.12. Controls testing plan submission

3.3.2.4.13. Controls testing

3.3.2.4.14. Performance Verification testing

3.3.2.4.15. Other systems testing, if required

3.3.2.4.16. Contractor's pre-final inspection

3.3.2.4.17. Correction of punch list from Contractor's pre-final inspection

3.3.2.4.18. Government's pre-final inspection

3.3.2.4.19. Correction of punch list from Government's pre-final inspection

3.3.2.4.20. Final Inspection

3.3.2.5. Government Activities. Show Government and other agency activities that could impact progress. These activities include but are not limited to: approvals, design reviews, review conferences, release for construction of design package(s), environmental permit approvals by State regulators, inspections, utility tie-ins, Government Furnished Property/Equipment (GFP) and Notice to Proceed for phasing requirements, if any.

3.3.2.6. Activity Responsibility Coding (RESP)

Assign Responsibility Code for all activities to the Prime Contractor, Subcontractor or Government agency responsible for performing the activity. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements. Code all activities not coded with a Government Responsibility Code to the Prime Contractor or Subcontractor responsible to perform the work. Activities shall not have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE). Unacceptable code values are abbreviations of the names of subcontractors.

3.3.2.7. Activity Work Area Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Work Area Code. Not all activities are required to be Work Area coded. A lack of Work Area coding will indicate the activity is not resource or space constrained.

3.3.2.8. Contract Changes/Requests for Equitable Adjustment (REA) Coding (MODF)

Assign Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer, with a Contract Changes/REA Code. Key all Code values to

the Government's modification numbering system. Any activity or sequence of activities added to the schedule as a result of alleged constructive changes made by the Government may be added to a copy of the current schedule, subject to the approval of the Contracting Officer. Assign Activity codes for these activities with a Contract Changes/REA Code. Key the code values to the Contractor's numbering system. Approval to add these activities does not necessarily mean the Government accepts responsibility and therefore liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the Government unless approved. An activity shall not have more than one Contract Changes/REA Code

#### 3.3.2.9. Contract Line Item (CLIN) Coding (BIDI)

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. An activity shall not contain more than one CLIN Item Code. CLIN Item code all activities, even when an activity is not cost loaded.

#### 3.3.2.10. Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities, based upon the phase of work in which the activity occurs. Code activities to either a Design Phase or a Construction Phase. Code fast track design and construction phases proposed by the Contractor to allow filtering and organizing the schedule by fast track design and construction packages. If the contract specifies construction phasing with separately defined performance periods, identify a Construction Phase Code to allow filtering and organizing the schedule accordingly. Each activity shall have only one Phase of Work code.

#### 3.3.2.11. Category of Work Coding (CATW)

Assign Category of Work code to all Activities based upon the category of work which the activity belongs. Category of Work Code must include, but is not limited to: Design, Design Submittal, design reviews, review conferences, Construction Submittal, Approvals (if any), Acceptance, Procurement, Fabrication, Delivery, Weather Sensitive Installation, Non-Weather Sensitive Installation, Start Up, Test, and Turnover. Assign a Category of Work code to each activity. Each activity shall have only one Category of Work Code.

#### 3.3.2.12. Definable Features of Work Coding (FOW1, FOW2, FOW3)

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 04.00 10, Contractor Quality Control. An activity shall not have more than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

### 3.3.3. Scheduled Project Completion and Activity Calendars

The schedule interval shall extend from NTP date to the required contract completion date. The contract completion activity (End Project) shall finish based on the required contract duration in the accepted contract proposal, as adjusted for any approved contract time extensions. The first scheduled work period shall be the day after NTP is acknowledged by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7 day calendar when the contract assigns calendar day durations for the activity such as a Government Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The Government will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

#### 3.3.3.1. Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. Include as the first activity in the project schedule an activity called "Start Project" or "NTP". The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, with a zero day duration.

### 3.3.3.2. Schedule Constraints and Open Ended Logic

Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the contract completion date for the project, and with a zero day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero fee float" or "zero total float" are typically prohibited. There shall only be 2 open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

### 3.3.3.3. Early Project Completion

In the event the Preliminary or Initial project schedule calculates an early completion date of the last activity prior to the contract completion date, the Contractor shall identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. The Contractor shall include all project and site overhead expenses through the required contract duration period in the contract cost. The Contractor will not be entitled to a time extension or price adjustment for extended overhead related costs due to any delays which may affect early contract completion prior to the required contract completion date. The last activity shall have a late finish constraint equal to the contract completion date and the schedule will calculate positive float. The Government will not approve an early completion schedule with zero float on the longest path. The Government is under no obligation to accelerate activities for which it is responsible to support a proposed early contract completion.

### 3.3.4. Interim Completion Dates

Constrain contractually specified interim completion dates to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.

#### 3.3.4.1. Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

#### 3.3.4.2. End Phase

Include as the last activity for a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the specified completion date for that phase and a zero day duration.

#### 3.3.4.3. Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" hammock activity shall be logically tied to the earliest and latest activities in the phase.

### 3.3.5. Default Progress Data Disallowed

Do not automatically update Actual Start and Finish dates with default mechanisms that may be included in the scheduling software. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's updated schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Disable program features which calculate one of these parameters from the other.

### 3.3.6. Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the Contracting Officer.

#### 3.3.7. Negative Lags and Start to Finish Relationships

Lag durations contained in the project schedule shall not have a negative value. Do not use Start to Finish relationships (SF).

#### 3.3.8. Calculation Mode

Schedule calculations shall retain the logic between predecessors and successors even when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

#### 3.3.9. Milestones

Include milestone activities for each significant project event including but not limited to: milestone activities for each fast track design package released for construction; design complete; foundation/substructure construction complete; superstructure construction complete; building dry-in or enclosure complete to allow the initiation of finish activities; permanent power complete; and building systems commissioning complete.

### 3.4. PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

#### 3.4.1. Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days for approval within 15 calendar days after the NTP is acknowledged. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. Detail it for the first 90 calendar days. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required Plan and Program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, the planned submissions of all early design packages, permitting activities, design review conference activities and other non-construction activities intended to occur within the first 90 calendar days. Schedule any construction activities planned for the first 90 calendar days after NTP. Constrain planned construction activities by Government acceptance of the associated design package(s) and all other specified Program and Plan approvals. Activity code any activities that are summary in nature after the first 90 calendar days with Responsibility Code (RESP) and Feature of Work code (FOW1, FOW2, FOW3)

#### 3.4.2. Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after NTP. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. The Initial Schedule shall be at a reasonable level of detail as determined by the Contracting Officer. Include detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead procurement activities required prior to design completion. The Initial Project Schedule shall include the entire construction sequence and all fast track construction activities, with as much detail as is known at the time but, as a minimum, shall include all construction start and completion milestone activities, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design

proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone.

#### 3.4.3. Design Package Schedule Submission:

With each design package submitted to the Government, submit a frag-net schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

#### 3.4.4. Periodic Schedule Updates

Based on the result of the meeting specified in PERIODIC SCHEDULE UPDATE MEETINGS, submit periodic schedule updates. These submissions shall enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made. Update the schedule to include detailed lower WBS activities procurement and construction activities as the design progresses, but not later than the submission of the final, un-reviewed design submission for each separate design package. The Contracting Officer may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission, if such activity is authorized.

#### 3.4.5. Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. A template SDEF compatible schedule backup file (sdef.prx) is available on the QCS website: [www.rmssupport.com](http://www.rmssupport.com). The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per Day
2	RESP	4	Responsible Party (e.g. GC, subcontractor, USACE)
3	AREA	4	Area of Work
4	MODF	6	Modification or REA number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of Work
7	CATW	1	Category of Work
8	FOW1	10	Feature of Work (used up to 10 characters in length)
9	FOW2	10	Feature of Work (used up to 20 characters in length)
10	FOW3	10	Feature of Work (used up to 30 characters in length)

### 3.5. SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

#### 3.5.1. Data CD's

Provide two sets of data CD's containing the project schedule in the backup format. Each CD shall also contain all previous update backup files. File medium shall be CD. Label each CD, indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file names. Each schedule shall have a unique file name as determined by the Contractor.

#### 3.5.2. Narrative Report

Provide a Narrative Report with the Preliminary, Initial, and each Periodic Update of the project schedule, as the basis of the progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths where the total float is less than or equal to 20 work days, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through its analysis. Identify and explain why any activities that, based their calculated late dates, should have either started or finished during the update period but did not.

#### 3.5.3. Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the Contracting Officer. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

#### 3.5.4. Schedule Reports

The format, filtering, organizing and sorting for each schedule report shall be as directed by the Contracting Officer. Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested. One or all of these reports may be requested for each schedule submission.

##### 3.5.4.1. Activity Report

A list of all activities sorted according to activity number.

##### 3.5.4.2. Logic Report

A list of detailed predecessor and successor activities for every activity in ascending order sorted by activity number.

##### 3.5.4.3. Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

##### 3.5.4.4. Earnings Report by CLIN

A compilation of the Contractor's Total Earnings on the project from the NTP to the data date. This report shall reflect the earnings of specific activities based on the agreements made in the schedule update meeting defined herein. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining progress payments. Group activities by CLIN Item number and sort by activity number. This report shall: sum all activities coded to a particular CLIN and provide a CLIN Item percent earned value; and complete and sum CLIN items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

### 3.5.5. Network Diagram

The network diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

#### 3.5.5.1. Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

#### 3.5.5.2. Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

#### 3.5.5.3. Critical Path

Clearly show the critical path.

#### 3.5.5.4. Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

#### 3.5.5.5. S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

### 3.6. PERIODIC SCHEDULE UPDATE MEETINGS

Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy and determining earned value. Meetings shall occur at least monthly within five days of the proposed schedule data date and after the Contractor has updated the schedule with Government concurrence respecting actual start dates, actual finish dates, remaining durations and percent complete for each activity it intend to status. Match the actual start and finish dates with the dates exported, as described in paragraph 3.3.5. Provide a computer with the scheduling software loaded and a projector during the meeting which allows all meeting participants to view the proposed schedule update during the meeting. The meeting and resultant approvable schedule update shall be a condition precedent to a formal submission of the update as described in SUBMISSION REQUIREMENTS and to the submission of an invoice for payment. The meeting will be a working interactive exchange which will allow the Government and the Contractor the opportunity review the updated schedule on a real time and interactive basis. The Contractor's authorized scheduling representative will organize, sort, filter and schedule the update as requested by the Government. The meeting will last no longer than 8 hours. A rough draft of the proposed activity logic corrections and narrative report shall be provided to the Government 48 hours in advance of the meeting. The Contractor's Project Manager and Authorized Scheduler shall attend the meeting with the Authorized Representative of the Contracting Officer.

#### 3.6.1. Update Submission Following Progress Meeting

Submit a complete update of the project schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.

#### 3.6.2. Status of Activities

Update status information, including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD) and Percent Complete shall be subject to the approval of the Government prior to the meeting. As a minimum, address the following items on an activity by activity basis during each progress meeting:



### 3.6.2.1. Actual Start and Finish Dates

Accurately status the AS and/or AF dates for each activity currently in-progress or completed since the last update. The Government may allow an AF date to be assigned with the percent complete less than 100% to account for the value of work remaining but not restraining successor activities. Only assign AS dates when actual progress occurs on an activity.

### 3.6.2.2. Remaining Duration

Update the estimated RD for all incomplete activities independent of Percent Complete. Remaining durations may exceed the activity OD or may exceed the activity's prior update RD if the Government considers the current OD or RD to be understated based on current progress, insufficient work crews actually manning the job, unrealistic OD or deficiencies that must be corrected that restrain successor activities.

### 3.6.2.3. Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be statused 100 percent complete. To allow for proper schedule management, cost load the correction of punch list from Government pre-final inspection activity(ies) not less than 1% of the total contract value, which activity(ies) may be declared 100 percent complete upon completion and correction of all punch list work identified during Government pre-final inspection(s).

### 3.6.2.4. Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions. The Government will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

### 3.6.2.5. Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule that does not represent the actual or planned prosecution and progress of the work.

## 3.7. REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the Contracting Officer: justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the Government. In response to each Request For Proposal issued by the Government, the Contractor shall submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

### 3.7.1. Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with its request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. The Contractor will not be entitled to a time extension or price adjustment for extended overhead related costs due to any delays which may affect early contract completion prior to the required contract completion date.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

### 3.7.2. Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

3.7.2.1. A list of affected activities, with their associated project schedule activity number.

3.7.2.2. A brief explanation of the causes of the change

3.7.2.3. An analysis of the overall impact of the changes proposed.

3.7.2.4. A sub-network of the affected area

Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

### 3.7.3. Additional Submission Requirements

The Contracting Officer may request an interim update with revised activities for any requested time extension of over 2 weeks. Provide this disk within 4 days of the Contracting Officer's request.

### 3.7.4. If Progress Falls Behind the Approved Project Schedule

3.7.4.1. Should progress fall behind the approved schedule (more than 20 work days of negative float) due to Contractor generated problems, promptly provide a supplemental recovery or completion schedule that illustrates its efforts to regain time to assure a completion by the required contract completion date.

3.7.4.2. The supplemental recovery or completion schedule will not replace the original, approved schedule as the official contract schedule. Continue to update the original, approved schedule on at least a monthly basis. In addition, the Contractor and the Contracting Officer will monitor the supplemental recovery or completion schedule on at least a bi-weekly basis to determine its effect on regaining the rate of progress to assure project completion by the contractually required completion date.

3.7.4.3. Do not artificially improve progress by simply revising the schedule logic, modifying or adding constraints, or shortening future work activity durations. Resource and manpower load the supplemental recovery schedule or completion schedule with crew size and productivity for each remaining activity, indicating overtime, weekend work, and/or double shifts needed to regain the schedule, in accordance with FAR 52.236.15, without additional cost to the Government. Indicate assumptions made and the basis for any logic, constraint, or duration changes used in the creation of the supplemental recovery or completion schedule in a narrative submitted for the Contracting Officer's approval. Any additional resources or manpower must be evident at the work site. Do not modify the official contract schedule to include these assumptions.

3.7.4.4. Failure to perform work and maintain progress in accordance with the supplemental recovery or completion schedule may result in an interim and final unsatisfactory performance rating and/or may result in corrective action by the Contracting Officer in accordance with FAR 52.236-15.

### 3.8. DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The Contracting Officer will approve proposed revisions to the schedule prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted

and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

### 3.9. WEEKLY PROGRESS MEETINGS

3.9.1. The Government and the Contractor shall meet weekly (or as otherwise mutually agreed to) between the meetings described in paragraph PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Authorized Representative of the Contracting Officer shall attend. The weekly progress meeting will address the status of RFI's, RFP's and Submittals.

3.9.2. Provide a bar chart produced by the scheduling software, organized by Total Float and Sorted by Early Start Date, and a two week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by Work Area Code (AREA) and sorted by Early Start Date.

3.9.3. The Government and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if Government responsibility coded activities require Government corrective action.

### 3.10. OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

### 3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Download and upload the schedule data into the Resident Management System (RMS) prior to RMS databases being transferred to the Government and is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and electronic export from QCS of the application for progress payment.

End of Section 01 32 01.00 10

**SECTION 01 33 00  
SUBMITTAL PROCEDURES**

**1.0 GENERAL**

- 1.1. DEFINITIONS
- 1.2. NOT USED
- 1.3. SUBMITTAL CLASSIFICATION
- 1.4. APPROVED OR CONCURRED WITH SUBMITTALS
- 1.5. DISAPPROVED SUBMITTALS
- 1.6. WITHHOLDING OF PAYMENT
- 1.7. GENERAL
- 1.8. SUBMITTAL REGISTER
- 1.9. SCHEDULING
- 1.10. TRANSMITTAL FORM (ENG FORM 4025)
- 1.11. SUBMITTAL PROCEDURES
- 1.12. CONTROL OF SUBMITTALS
- 1.13. GOVERNMENT APPROVED SUBMITTALS
- 1.14. INFORMATION ONLY SUBMITTALS
- 1.15. STAMPS

## **1.0 GENERAL**

### **1.1. DEFINITIONS**

#### **1.1.1. Submittal**

Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

#### **1.1.2. Submittal Descriptions (SD)**

Submittals requirements are specified in the technical sections. Submittals are identified by SD numbers and titles as follows.

##### **SD-01 Preconstruction Submittals**

- Certificates of insurance.
- Surety bonds.
- List of proposed subcontractors.
- List of proposed products.
- Construction Progress Schedule.
- Submittal register.
- Schedule of prices.
- Accident Prevention Plan.
- Work plan.
- Quality control plan.
- Environmental protection plan.

##### **SD-02 Shop Drawings**

- Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.
- Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.
- Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

##### **SD-03 Product Data**

- Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.
- Samples of warranty language when the contract requires extended product warranties.

##### **SD-04 Samples**

- Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.
- Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.
- Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those which will be removed at conclusion of the work.

##### **SD-05 Design Data**

- Calculations, mix designs, analyses or other data pertaining to a part of work.
- Design submittals, design substantiation submittals and extensions of design submittals.

##### **SD-06 Test Reports**

- Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must

have been within three years of date of contract award for the project.)

- Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.
- Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- Investigation reports.
- Daily checklists.
- Final acceptance test and operational test procedure.

#### SD-07 Certificates

- Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.
- Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.
- Confined space entry permits.
- Text of posted operating instructions.

#### SD-08 Manufacturer's Instructions

- Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

#### SD-09 Manufacturer's Field Reports

- Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- Factory test reports.

#### SD-10 Operation and Maintenance Data

- Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

#### SD-11 Closeout Submittals

- Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

##### 1.1.3. Approving Authority

Office authorized to approve submittal.

##### 1.1.4. Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

##### 1.2. NOT USED

##### 1.3. SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

##### 1.3.1. Designer of Record Approved (DA)

1.3.1.1. Designer of Record (DOR) approval is required for all extensions of design, critical materials, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". Provide the Government the number of copies designated hereinafter of all DOR approved submittals, after the DOR has taken appropriate action. The DOR shall ensure that submittals conform to the Solicitation, the Accepted Proposal and the completed design, however see below for those submittals proposing a deviation to the contract or a substitution of a material, system, or piece of equipment that was identified by manufacturer, brand name or model description in the accepted contract proposal.

1.3.1.2. The DOR shall ensure that the submittals comply with all applicable Buy American Act and Trade Agreement Act clauses in the contract. The DOR may confer with the Contracting Officer's Representative for advice and interpretation of those clauses, as necessary.

1.3.1.3. The Government may, but is not required to, review any or all DOR approved submittals for conformance to the solicitation, accepted proposal and the completed design. Except for submittals designated as deviating from the Solicitation, the Accepted Proposal or completed design, the Contractor may proceed with acquisition and installation upon DOR approval. Government Approved (GA)

#### 1.3.2. Government Approved (GA)

Government approval is required for any item specifically designated as requiring Government approval in the Solicitation, for internal and external color finish selections and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

#### 1.3.3. Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Section 01 33 16 **DESIGN AFTER AWARD** covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards and contract requirements. Design data includes the design documents described in Section 01 33 16 **DESIGN AFTER AWARD**. Generally, design submittals should be identified as SD-05 Design Data submittals.

#### 1.3.4. Designer of Record Approved/Government Conformance Review (DA/CR)

1.3.4.1. Deviations to the Accepted Design. Designer of Record approval and the Government's concurrence are required for any proposed deviation from the accepted design which still complies with the contract (the Solicitation and Accepted Proposal) before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the DOR may discuss a submittal proposing a deviation with the Contracting Officer's Representative prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing an opinion, if it deems it necessary. In any case, the Government will not formally agree to or provide a preliminary opinion on any deviation without the DOR's approval or recommended approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

1.3.4.2. Substitutions. Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal.

#### 1.3.5. Designer of Record Approved/Government Approved (DA/GA)

Any proposed deviation to the solicitation and/or the accepted proposal constitutes a change to the contract. In addition to the above stated requirements for proposed deviations to the accepted design, both Designer of Record and Government Approval and, where applicable, a contract modification are required before the Contractor is

authorized to proceed with material acquisition or installation for any proposed deviation to the contract. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". The Government reserves the right to accept or reject any such proposed deviation at its discretion.

#### 1.3.6. Information Only

All submittals not requiring Designer of Record or Government approval will be for information only. Provide the Government "For Information Only" copies of all submittals not requiring Government approval or concurrence, after the Designer of Record has taken the appropriate action.

#### 1.4. APPROVED OR CONCURRED WITH SUBMITTALS

Do not construe the Contracting Officer's approval of or concurrence with submittals as a complete check, but only that design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval or concurrence will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work. The Government won't consider re-submittals for the purpose of substituting previously approved materials or equipment unless accompanied by an explanation of why a substitution is necessary.

#### 1.5. DISAPPROVED SUBMITTALS

Make all corrections required by the Contracting Officer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Resubmit any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal as one requiring "approval" action, requiring both Designer of Record and Government approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, provide prompt notice in accordance with the Contract Clause "Changes" to the Contracting Officer.

#### 1.6. WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

#### 1.7. GENERAL

Make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, the Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, shall check, approve, sign, and stamp all items, indicating action taken. Clearly identify proposed deviations from the contract requirements. Include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Schedule and make submittals requiring Government approval prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples remaining upon completion of the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

#### 1.8. SUBMITTAL REGISTER (GA)

Develop a complete list of submittals, including each separate design package submittal. Submit the initial submittal register within 15 days after Notice to Proceed, including, as a minimum, the design packages and other initial submittals required elsewhere in the contract. The Designer of Record shall identify required submittals in the



specifications, and use the list to prepare the Submittal Register, utilizing the government-provided software, QCS (see Section 01 45 01.10), to create the ENG Form 4288. Appendix Ris a preliminary submittal register input form for use with the Quality Management System and the Resident Office Management System (QCS and RMS). The Government will provide the Contractor the actual Excel Spreadsheet version of this sample input form after award to modify and to use for input into QCS. The Excel Spreadsheet is not totally inputable into QCS, so additional keystroke input will be necessary. The sample input form is not all-inclusive. In addition, additional submittals may be required by other parts of the contract. After award, the parties will meet to discuss contract specific (or task order specific for a task order contract) distribution for the submittals all-inclusive and additional submittals may be required by other parts of the contract. Develop and complete the submittal register as the design is completed. Submit it to the Contracting Officer with the un-reviewed final design package submission or as soon as the design specifications are completed, if before the final design submission. When applicable, if the Contractor elects to fast track design and construction, using multiple design package submissions, update the submittal register to reflect the submittals associated with each design submission, clearly denoting all revisions to the previous submission. The submittal register serves as a scheduling document for submittals and for control of submittal actions throughout the contract period. Coordinate the submit dates and need dates used in the submittal register with dates in the Contractor prepared progress schedule. Submit monthly updates to the submittal register showing the Contractor action codes and actual dates with Government action codes and actual dates or until all submittals have been satisfactorily completed. Revise and submit the submittal register when revising the progress schedule.

#### 1.9. SCHEDULING

Schedule submittals covering component items forming a system or items that are interrelated to be coordinated and submitted concurrently. Schedule certifications to be submitted with the pertinent drawings. Allow adequate time (a minimum of 15 calendar days exclusive of mailing time) and show on the register for those items requiring Government approval or concurrence. No delay damages or time extensions will be allowed for time lost in late submittals by the Contractor.

#### 1.10. TRANSMITTAL FORM (ENG FORM 4025)

Use the transmittal form (ENG Form 4025) for submitting submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor or are included in the QCS software if the Contractor is required to use QCS for this contract. Use a separate transmittal form for each specification section. Complete this form by filling out all the heading blank spaces and identify each item submitted. Exercise special care to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

#### 1.11. SUBMITTAL PROCEDURES

Make submittals as follows:

##### 1.11.1. Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Post-Award Conference.

##### 1.11.2. Deviations

For submittals which include proposed deviations requested by the Contractor, check the column "variation" of ENG Form 4025. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

#### 1.12. CONTROL OF SUBMITTALS

Carefully control his procurement operations to ensure that each individual submittal is made on or before the scheduled submittal date shown on the approved "Submittal Register."

#### 1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

Upon completion of review of submittals requiring Government approval or concurrence, the Government will stamp and date the submittals as approved or concurred.. The Government will retain three (3) copies of the submittal and return one (1) copy(ies) of the submittal.

#### 1.14. INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. The Government will retain three (3) copies of information only submittals.

#### 1.15. STAMPS

Use stamps similar to the following on the submittal data to certify that the submittal meets contract requirements:

CONTRACTOR

(FIRM NAME)

Approved

Approved with corrections as noted on submittal data and/or attached  
sheet(s)

Signature:

Title:

Date:

**For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record shall stamp and sign to certify that the submittal meets contract requirements.**

**SECTION 01 33 16  
DESIGN AFTER AWARD**

**1.0 GENERAL INFORMATION**

1.1. INTRODUCTION

1.2. DESIGNER OF RECORD

**2.0 PRODUCTS (Not Applicable)**

**3.0 EXECUTION**

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

3.1.2. Post Award Conference

3.1.3. Partnering & Project Progress Processes

3.1.4. Initial Design Conference

3.1.5. Pre-Construction Conference

3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

3.2.1. Site/Utilities

3.2.2. Interim Design Submittals

3.2.3. Over-the-Shoulder Progress Reviews

3.2.4. Final Design Submissions

3.2.5. Design Complete Submittals

3.2.6. Holiday Periods for Government Review or Actions

3.2.7. Late Submittals and Reviews

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

3.3.2. Tracking Design Review Comments

3.3.3. Design and Code Checklists

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

3.4.2. Procedures

3.4.3. Conference Documentation

3.5. INTERIM DESIGN REQUIREMENTS

3.5.1. Drawings

3.5.2. Design Analyses

3.5.3. Geotechnical Investigations and Reports

3.5.4. LEED Documentation

3.5.5. Energy Conservation

3.5.6. Specifications

3.5.7. Building Rendering

3.5.8. Interim Building Design Contents

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

3.7. FINAL DESIGN REQUIREMENTS

3.7.1. Drawings

3.7.2. Design Analysis

3.7.3. Specifications

3.7.4. Submittal Register

3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

3.7.6. Acceptance and Release for Construction

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

3.9.2. Web based Design Submittals

3.9.3. Mailing of Design Submittals

3.10. AS-BUILT DOCUMENTS

**ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS**

**ATTACHMENT B FURNITURE, FIXTURES AND EQUIPMENT REQUIREMENTS**

**ATTACHMENT C TRACKING COMMENTS IN DRCHECKS**

**ATTACHMENT D SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW**

**ATTACHMENT E LEED SUBMITTALS**

**ATTACHMENT F BUILDING INFORMATION MODELING REQUIREMENTS**

**ATTACHMENT G DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

## **1.0 GENERAL INFORMATION**

### **1.1. INTRODUCTION**

1.1.1. The information contained in this section applies to the design required after award. After award, the Contractor will develop the accepted proposal into the completed design, as described herein.

1.1.2. The Contractor may elect to fast track the design and construction that is, proceed with construction of parts of the sitework and facilities prior to completion of the overall design. To facilitate fast tracking, the Contractor may elect to divide the design into no more than six (6) design packages per major facility type and no more than three (3) design packages for site and associated work. Designate how it will package the design, consistent with its overall plan for permitting (where applicable) and construction of the project. See Sections 01 33 00 SUBMITTAL PROCEDURES and 01 32 01.00 10 PROJECT SCHEDULE for requirements for identifying and scheduling the design packaging plan in the submittal register and project schedule. See also Sections 01 10 00 STATEMENT OF WORK and 01 57 20.00 10 ENVIRONMENTAL PROTECTION for any specified permit requirements. If early procurement of long-lead item construction materials or installed equipment, prior to completion of the associated design package, is necessary to facilitate the project schedule, also identify those long-lead items and how it will assure design integrity of the associated design package to meet the contract requirements (The Contract consists of the Solicitation requirements and the accepted proposal). Once the Government is satisfied that the long-lead items meet the contract requirements, the Contracting Officer will allow the Contractor to procure the items at its own risk.

1.1.3. The Contractor may proceed with the construction work included in a separate design package after the Government has reviewed the final (100%) design submission for that package, review comments have been addressed and resolved to the Government's satisfaction and the Contracting Officer (or the Administrative Contracting Officer) has agreed that the design package may be released for construction.

1.1.4. **INTEGRATED DESIGN.** To the maximum extent permitted for this project, use a collaborative, integrated design process for all stages of project delivery with comprehensive performance goals for siting, energy, water, materials and indoor environmental quality and ensures incorporation of these goals. Consider all stages of the building lifecycle, including deconstruction.

### **1.2. DESIGNER OF RECORD**

Identify, for approval, the Designer of Record ("DOR") that will be responsible for each area of design. One DOR may be responsible for more than one area. Listed, Professional Registered, DOR(s) shall account for all areas of design disciplines shall be accounted for by a listed. The DOR's shall stamp, sign, and date each design drawing and other design deliverables under their responsible discipline at each design submittal stage (see contract clause Registration of Designers). If the deliverables are not ready for release for construction, identify them as "preliminary" or "not for release for construction" or by using some other appropriate designation. The DOR(s) shall also be responsible for maintaining the integrity of the design and for compliance with the contract requirements through construction and documentation of the as-built condition by coordination, review and approval of extensions of design, material, equipment and other construction submittals, review and approval or disapproval of requested deviations to the accepted design or to the contract, coordination with the Government of the above activities, and by performing other typical professional designer responsibilities.

## **2.0 PRODUCTS (Not Applicable)**

## **3.0 EXECUTION**

### **3.1. PRE-WORK ACTIVITIES & CONFERENCES**

#### **3.1.1. Design Quality Control Plan**

Submit for Government acceptance, a Design Quality Control Plan in accordance with Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL before design may proceed.

#### **3.1.2. Post Award Conference**

3.1.2.1. The government will conduct a post award contract administration conference at the project site, as soon as possible after contract award. This will be coordinated with issuance of the contract notice to proceed (NTP). The Contractor and major sub-contractor representatives shall participate. All designers need not attend this first meeting. Government representatives will include COE project delivery team members, facility users, facility command representatives, and installation representatives. The Government will provide an agenda, meeting goals, meeting place, and meeting time to participants prior to the meeting.

3.1.2.2. The post award conference shall include determination and introduction of contact persons, their authorities, contract administration requirements, discussion of expected project progress processes, and coordination of subsequent meetings for quality control (see Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL), Partnering (see below and SCR: Partnering), and the initial design conference (see below).

3.1.2.3. The government will introduce COE project delivery team members, facility users, facility command representatives, and installation representatives. The DB Contractor shall introduce major subcontractors, and other needed staff. Expectations and duties of each person shall be defined for all participants. A meeting roster shall be developed and distributed by the government with complete contact information including name, office, project role, phone, mailing and physical address, and email address.

### 3.1.3. Partnering & Project Progress Processes

3.1.3.1. The initial Partnering conference may be scheduled and conducted at any time with or following the post award conference. The Government proposes to form a partnership with the DB Contractor to develop a cohesive building team. This partnership will involve the COE project delivery team members, facility users, facility command representatives, installation representatives, Designers of Record, major subcontractors, contractor quality control staff, and contractor construction management staff. This partnership will strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership will be bilateral in membership and participation will be totally voluntary. All costs, excluding labor and travel expenses, shall be shared equally between the Government and the Contractor. The Contractor and Government shall be responsible for their own labor and travel costs. Normally, partnering meetings will be held at or in the vicinity of the project installation.

3.1.3.2. As part of the partnering process, the Government and Contractor shall develop, establish, and agree to comprehensive design development processes including conduct of conferences, expectations of design development at conferences, fast-tracking, design acceptance, Structural Interior Design (SID)/ Furniture, Fixtures & Equipment (FF&E) design approval, project closeout, etc. The government will explain contract requirements and the DB Contractor shall review their proposed project schedule and suggest ways to streamline processes.

### 3.1.4. Initial Design Conference

The initial design conference may be scheduled and conducted at the project installation any time after the post award conference, although it is recommended that the partnering process be initiated with or before the initial design conference. Any design work conducted after award and prior to this conference should be limited to site and is discouraged for other items. All Designers of Record shall participate in the conference. The purpose of the meeting is to introduce everyone and to make sure any needs the contractor has are assigned and due dates established as well as who will get the information. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning the BIM Implementation Plan demonstration at this meeting. The DB Contractor shall conduct the initial design conference.

### 3.1.5. Pre-Construction Conference

Before starting construction activities, the Contractor and Government will jointly conduct a pre-construction administrative conference to discuss any outstanding requirements and to review local installation requirements for start of construction. It is possible there will be multiple Pre-Construction Conferences based on the content of the design packages selected by the Contractor. The Government will provide minutes of this meeting to all participants.

## 3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

The stages of design submittals described below define Government expectations with respect to process and content. The Contractor shall determine how to best plan and execute the design and review process for this project, within the parameters listed below. As a minimum, the Government expects to see at least one interim design submittal, at least one final design submittal before construction of a design package may proceed and at least one Design Complete submittal that documents the accepted design. The Contractor may sub-divide the design into separate packages for each stage of design and may proceed with construction of a package after the Government accepts the final design for that package. See discussion on waivers to submission of one or more intermediate design packages where the parties partner during the design process. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning BIM and the various stages of design submittals and over-the-shoulder progress reviews.

### 3.2.1. Site/Utilities

To facilitate fast-track design-construction activities the contractor may submit a final (100%) site and utility design as the first design submittal or it may elect to submit interim and final site and utility design submittals as explained below. Following review, resolution, and incorporation of all Government comments, and submittal of a satisfactory set of site/utility design documents, after completing all other pre-construction requirements in this contract and after the pre-construction meeting, the Government will allow the Contractor to proceed with site development activities, including demolition where applicable, within the parameters set forth in the accepted design submittal. For the first site and utility design submission, whether an interim or final, the submittal review, comment, and resolution times from this specification apply, except that the Contractor shall allow the Government a 14 calendar day review period, exclusive of mailing time. No on-site construction activities shall begin prior to written Government clearance to proceed.

### 3.2.2. Interim Design Submittals

The Contractor may submit either a single interim design for review, representing a complete package with all design disciplines, or split the interim design into smaller, individual design packages as it deems necessary for fast-track construction purposes. As required in Section 01 32 01.00 10 PROJECT SCHEDULE, the Contractor shall schedule its design and construction packaging plan to meet the contract completion period. This submission is the Government's primary opportunity to review the design for conformance to the solicitation and to the accepted contract proposal and to the Building Codes at a point where required revisions may be still made, while minimizing lost design effort to keep the design on track with the contract requirements. The requirements for the interim design review submittals and review conferences are described hereinafter. This is not necessarily a hold point for the design process; the Contractor may designate the interim design submittal(s) as a snapshot and proceed with design development at its own risk. See below for a waiver, where the parties establish an effective over-the-shoulder progress review procedure through the partnering process that would eliminate the need for or expedite a formal intermediate design review on one or more individual design packages.

### 3.2.3. Over-the-Shoulder Progress Reviews

To facilitate a streamlined design-build process, the Government and the Contractor may agree to one-on-one reviewer or small group reviews, electronically, on-line (if available within the Contractor's standard design practices) or at the Contractor's design offices or other agreed location, when practicable to the parties. The Government and Contractor will coordinate such reviews to minimize or eliminate disruptions to the design process. Any data required for these reviews shall normally be provided in electronic format, rather than in hard copy. If the Government and Contractor establish and implement an effective, mutually agreeable partnering procedure for regular (e.g., weekly) over-the shoulder review procedures that allow the Government reviewers the opportunity to keep fully informed of the progress, contents, design intent, design documentation, etc. of the design package, the Government will agree to waive or to expedite the formal intermediate design review period for that package. The Contractor shall still be required to submit the required intermediate design documentation, however the parties may agree to how that material will be provided, in lieu of a formal consolidated submission of the package. It should be noted that Government funding is extremely limited for non-local travel by design reviewers, so the maximum use of virtual teaming methods must be used. Some possible examples include electronic file sharing, interactive software with on-line or telephonic conferencing, televideo conferencing, etc. The Government must still perform its Code and Contract conformance reviews, so the Contractor is encouraged to partner with the reviewers to find ways to facilitate this process and to facilitate meeting or bettering the design-build schedule. The Contractor shall maintain a fully functional configuration management system as described herein to track design revisions, regardless of whether or not there is a need for a formal intermediate design review. The formal intermediate



review procedures shall form the contractual basis for the official schedule, in the event that the partnering process determines that the formal intermediate review process to be best suited for efficient project execution. However, the Government pledges to support and promote the partnering process to work with the Contractor to find ways to better the design schedule.

#### 3.2.4. Final Design Submissions

This submittal is required for each design package prior to Government acceptance of that design package for construction. The requirements for the final design submittal review conferences and the Government's acceptance for start of construction are described herein after.

#### 3.2.5. Design Complete Submittals

After the final design submission and review conference for a design package, revise the design package to incorporate the comments generated and resolved in the final review conferences, perform and document a back-check review and submit the final, design complete documents, which shall represent released for construction documents. The requirements for the design complete submittals are described hereinafter.

#### 3.2.6. Holiday Periods for Government Review or Actions

Do not schedule meetings, Government reviews or responses during the last two weeks of December or other designated Government Holidays (including Friday after Thanksgiving). Exclude such dates and periods from any durations specified herein for Government actions.

#### 3.2.7. Late Submittals and Reviews

If the Contractor cannot meet its scheduled submittal date for a design package, it must revise the proposed submittal date and notify the government in writing, at least one (1) week prior to the submittal, in order to accommodate the Government reviewers' other scheduled activities. If a design submittal is over one (1) day late in accordance with the latest revised design schedule, or if notification of a proposed design schedule change is less than seven (7) days from the anticipated design submission receipt date, the Government review period may be extended up to seven (7) days due to reviewers' schedule conflicts. If the Government is late in meeting its review commitment and the delay increases the Contractor's cost or delays completion of the project, the Suspension of Work and Defaults clauses provide the respective remedy or relief for the delay.

### 3.3. DESIGN CONFIGURATION MANAGEMENT

#### 3.3.1. Procedures

Develop and maintain effective, acceptable design configuration management (DCM) procedures to control and track all revisions to the design documents after the Interim Design Submission through submission of the As-Built documents. During the design process, this will facilitate and help streamline the design and review schedule. After the final design is accepted, this process provides control of and documents revisions to the accepted design (See Special Contract Requirement: Deviating From the Accepted Design). The system shall include appropriate authorities and concurrences to authorize revisions, including documentation as to why the revision must be made. The DCM data shall be available to the Government reviewers at all times. The Contractor may use its own internal system with interactive Government concurrences, where necessary or may use the Government's "DrChecks Design Review and Checking System" (see below and Attachment C).

#### 3.3.2. Tracking Design Review Comments

Although the Contractor may use its own internal system for overall design configuration management, the Government and the Contractor shall use the DrChecks Design Review and Checking System to initiate, respond to, resolve and track Government design compliance review comments. This system may be useful for other data which needs to be interactive or otherwise available for shared use and retrieval. See Attachment C for details on how to establish an account and set-up the DrChecks system for use on the project.

#### 3.3.3. Design and Code Checklists

Develop and complete various discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists with each design submittal, as applicable, as part of the project documentation. See Section 01 45 04.00 10 Contractor Quality Control, Attachment D for a Sample Fire Protection and Life Safety Code review checklist and Attachment E for LEED SUBMITTALS.

### 3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

#### 3.4.1. General

At least one interim design submittal, review and review conference is required for each design package (except that, per paragraph 3.2.1, the Contractor may skip the interim design submission and proceed directly to final design on the sitework and utilities package). The DB Contractor may include additional interim design conferences or over-the-shoulder reviews, as needed, to assure continued government concurrence with the design work. Include the interim submittal review periods and conferences in the project schedule and indicate what part of the design work is at what percentage of completion. The required interim design conferences shall be held when interim design requirements are reached as described below. See also Paragraph: **Over-the-Shoulder Progress Reviews** for a waiver to the formal interim design review.

#### 3.4.2. Procedures

After receipt of an Interim Design submission, allow the Government fourteen (14) calendar days after receipt of the submission to review and comment on the interim design submittal. For smaller design packages, especially those that involve only one or a few separate design disciplines, the parties may agree on a shorter review period or alternative review methods (e.g., over-the-shoulder or electronic file sharing), through the partnering process. For each interim design review submittal, the COR will furnish, to the Contractor, a single consolidated, validated listing of all comments from the various design sections and from other concerned agencies involved in the review process using the DrChecks Design Review and Checking System. The review will be for conformance with the technical requirements of the solicitation and the Contractor's RFP proposal. If the Contractor disagrees technically with any comment or comments and does not intend to comply with the comment, he/she must clearly outline, with ample justification, the reasons for noncompliance within five (5) days after receipt of these comments in order that the comment can be resolved. Furnish disposition of all comments, in writing, through DrChecks. The Contractor is cautioned that if it believes the action required by any comment exceeds the requirements of this contract, that it should take no action and notify the COR in writing immediately. The Interim Review conference will be held for each design submittal at the installation. Bring the personnel that developed the design submittal to the review conference. The conference will take place the week after the receipt of the comments by the Contractor. For smaller fast-track packages that involve only a few reviewers, the parties may agree to alternative conferencing methods, such as teleconferencing, or televideo, where available, as determined through Partnering.

#### 3.4.3. Conference Documentation

3.4.3.1. In order to facilitate and accelerate the Government code and contract conformance reviews, identify, track resolution of and maintain all comments and action items generated during the design process and make this available to the designers and reviewers prior to the Interim and subsequent design reviews.

3.4.3.2. The DB Contractor shall prepare meeting minutes and enter final resolution of all comments into DrChecks. Copies of comments, annotated with comment action agreed on, will be made available to all parties before the conference adjourns. Unresolved problems will be resolved by immediate follow-on action at the end of conferences. Incorporate valid comments. The Government reserves the right to reject design document submittals if comments are significant. Participants shall determine if any comments are critical enough to require further design development prior to government concurrence. Participants shall also determine how to proceed in order to obtain government concurrence with the design work presented.

### 3.5. INTERIM DESIGN REQUIREMENTS

Interim design deliverables shall include drawings, specifications, and design analysis for the part of design that the Contractor considers ready for review.

#### 3.5.1. Drawings

Include comments from any previous design conferences incorporated into the documents to provide an interim design for the "part" submitted.

### 3.5.2. Design Analyses

3.5.2.1. The designers of record shall prepare and present design analyses with calculations necessary to substantiate and support all design documents submitted. Address design substantiation required by the applicable codes and references and pay particular attention to the following listed items:

3.5.2.2. For parts including sitework, include site specific civil calculations.

3.5.2.3. For parts including structural work, include structural calculations.

- (a) Identify all loads to be used for design.
- (b) Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.
- (c) Provide calculations for all principal roof, floor, and foundation members and bracing and secondary members.
- (d) Provide complete seismic analyses for all building structural, mechanical, electrical, architectural, and building features as dictated by the seismic zone for which the facility is being constructed.
- (e) Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.
- (f) See also the Security (Anti-Terrorism) requirements below for members subject to Anti-Terrorist Force Protection (ATFP) and Progressive Collapse requirements.
- (g) Fully coordinate and integrate the overall structural design between two different or interfacing construction types, such as modular and stick-built or multistory, stacked modular construction. Provide substantiation of structural, consolidation/settlement analysis, etc., as applicable, through the interfaces.

3.5.2.4. For Security (Anti-Terrorism): Provide a design narrative and calculations where applicable, demonstrating compliance with each of the 22 standards in UFC 4-010-01, which includes Design of Buildings to Resist Progressive Collapse (use the most recent version of UFC 4-023-03, regardless of references to any specific version in UFC 4-010-01). Where sufficient standoff distance is not being provided, show calculations for blast resistance of the structural system and building envelope. Show complete calculations for members subjected to ATFP loads, e.g., support members of glazed items (jamb, headers, sills) connections of windows to support members and connections of support members to the rest of the structure. For 3 story and higher buildings, provide calculations to demonstrate compliance with progressive collapse requirements.

3.5.2.5. For parts including architectural work, include building floor area analysis.

3.5.2.6. For parts including mechanical work, include HVAC analysis and calculations. Include complete design calculations for mechanical systems. Include computations for sizing equipment, compressed air systems, air duct design, and U-factors for ceilings, roofs and exterior walls and floors. Contractor shall employ commercially available energy analysis techniques to determine the energy performance of all passive systems and features. Use of hourly energy load computer simulation is required (see paragraph 3.5.5.2 for list of acceptable software). Based on the results of calculations, provide a complete list of the materials and equipment proposed with the manufacturer's published cataloged product installation specifications and roughing-in data.

3.5.2.7. For parts including life safety, include building code analysis and sprinkler and other suppression systems. Notwithstanding the requirements of the Codes, address the following:

- (a) A registered fire protection engineer (FPE) must perform all fire protection analyses. Provide the fire protection engineer's qualifications. See Section 01 10 00, paragraph 5 for qualifications.

- (b) Provide all references used in the design including Government design documents and industry standards used to generate the fire protection analysis.
- (c) Provide classification of each building in accordance with fire zone, building floor areas and height and number of stories.
- (d) Provide discussion and description of required fire protection requirements including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.
- (e) Provide hydraulic calculations based on water flow test for each sprinkler system to insure that flow and pressure requirements can be met with current water supply. Include copies of Contractor's water flow testing done to certify the available water source.

3.5.2.8. For parts including plumbing systems:

- (a) List all references used in the design.
- (b) Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.
- (c) Detail calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping; LP gas piping and tanks, fuel oil piping and tanks, etc., as applicable.
- (d) When the geotechnical report indicates expansive soils are present, indicate in the first piping design submittal how piping systems will be protected against damage or backfall/backflow due to soil heave (from penetration of slab to the 5 foot building line).

3.5.2.9. For elevator systems:

- (a) List all criteria codes, documents and design conditions used.
- (b) List any required permits and registrations for construction of items of special mechanical systems and equipment.

3.5.2.10. For parts including electrical work, include lighting calculations to determine maintained foot-candle levels, electrical load analysis and calculations, electrical short circuit and protective device coordination analysis and calculations and arc fault calculations.

3.5.2.11. For parts including telecommunications voice/data (including SIPRNET, where applicable), include analysis for determining the number and placement of outlets

3.5.2.12. For Cathodic Protection Systems, provide the following stamped report by the licensed corrosion engineer or NACE specialist with the first design submission. The designer must be qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. He/she must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection Specialist, or must be a registered professional engineer with a minimum of five years experience in corrosion control and cathodic protection. Clearly describe structures, systems or components in soil or water to be protected. Describe methods proposed for protection of each.

3.5.2.13. Air Barrier System: Provide a narrative of the design and installation requirements for the Air Barrier system. As part of the design quality control process an air barrier consultant shall review drawing details to assure that details of critical Air Barrier components are properly detailed and incorporated during the design drawings and process (i.e. window flashing details, penetration in air barrier details, door flashing details, roofing/ceiling barrier interface details and etc.). Furnish the Government written review details and results.

3.5.3. Geotechnical Investigations and Reports:

3.5.3.1. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal. Make this information available as early as possible during the over-the-shoulder progress review process. Summarize the subsurface conditions and provide recommendations for the design of appropriate utilities, foundations, floor slabs, retaining walls, embankments, and pavements. Include compaction requirements for fill and backfill under buildings, sidewalks, other structures and open areas. Recommend foundation systems to be used, allowable bearing pressures for footings, lateral load

resistance capacities for foundation systems, elevations for footings, grade beams, slabs, etc. Provide an assessment of post-construction settlement potential including total and differential. Provide recommendations regarding lateral earth pressures (active, at-rest, passive) to be used in the design of retaining walls. Include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Include calculations to support the recommendations for bearing capacity, settlement, and pavement sections. Include supporting documentation for all recommended design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. Provide earthwork recommendations, expected frost penetration, expected groundwater levels, recommendations for dewatering and groundwater control and the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, old fill, old structures, soft areas, or unusual soil conditions. Include pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. Include the raw field data. Arrange a meeting with the Government subsequent to completion and evaluation of the site specific geotechnical exploration to outline any differences encountered that are inconsistent with the Government provided preliminary soils information. Clearly outline differences which require changes in the foundation type, or pavement and earthwork requirements from that possible and contemplated using the Government furnished preliminary soils investigation, which result in a change to the design or construction. Any equitable adjustment is subject to the provisions of the contract's Differing Site Conditions Clause.

3.5.3.2. Vehicle Pavements: The Contractor's geotechnical report shall contain flexible and rigid pavement designs, as applicable for the project, including design CBR and modulus of subgrade reaction and the required compaction effort for subgrades and pavement layers. Provide Information on the types of base course materials available in the area and design strengths.

3.5.3.3. The Contractor and the professional geotechnical engineer consultant shall certify in writing that the design of the project has been developed consistent with the Contractor's final geotechnical report. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the first design submission. If revisions are made to the initial design submission, a new certification shall be provided with the final design submission.

#### 3.5.4. LEED Documentation:

Assign a LEED Accredited Professional, responsible to track LEED planning, performance and documentation for each LEED credit through construction closeout. Incorporate LEED credits in the plans, specifications and design analyses. Develop LEED supporting documentation as a separable portion of the Design Analysis and provide with each required design submittal. Include the LEED Project checklist for each non-exempt facility (one checklist may be provided for multiple facilities in accordance with the LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects and the LEED SUBMITTALS (Attachment E, herein) with each submittal. Final design submittal for each portion of the work must include all required design documentation relating to that portion of work (example - all site credit design documents with final site design). Submittal requirements are as indicated in Attachment E, LEED SUBMITTALS. Submit all documentation indicated on Attachment E as due at final design at final design submittal (for fast-track projects with multiple final design submittals, this shall be at the last scheduled final design submittal). All project documentation related to LEED shall conform to USGBC requirements for both content and format, including audit requirements and be separate from other design analyses. Maintain and update the LEED documentation throughout project progress to construction closeout and shall compile product data, receipts, calculations and other data necessary to substantiate and support all credits claimed. The Government may audit any or all individual credits. Audit documentation is not required to be submitted unless requested. These requirements apply to all projects. If the project requires the Contractor to obtain USGBC certification, the Contractor shall also be responsible for obtaining USGBC certification and shall provide written evidence of certification with the construction closeout LEED documentation submittal. Install the USGBC building plaque at the location indicated by the Government upon receipt. If Contractor obtains USGBC interim design review, submit the USGBC review to the Government within 30 days of receipt for information only.

3.5.4.1. LEED Documentation for Technology Solution Set. If the Solicitation provides a Prescriptive Technology Solution Set, use of the Technology Solution set has no effect on LEED documentation requirements. Provide all required LEED documentation, including energy analysis, in accordance with LEED requirements when using the Technology Solution Set.

#### 3.5.5. Energy Conservation:

3.5.5.1. Refer to Section 01 10 00, Paragraph 5. Interim and Final Design submittals shall demonstrate that each building including the building envelope, HVAC systems, service water heating, power, and lighting systems meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Use Compliance Documentation forms available from ASHRAE and included in the ASHRAE 90.1 User's Manual for this purpose. The Architectural Section of the Design Analysis shall include completed forms titled "Building Envelope Compliance Documentation Parts I and II". The Heating Ventilating and Air Conditioning (HVAC) Section of the Design Analysis shall include a completed form titled "HVAC Simplified Approach Option - Part I" if this approach is allowed by the Standard. Otherwise, the HVAC Section of the Design Analysis shall include completed forms titled "HVAC Mandatory Provisions - Part II" and "HVAC Prescriptive Requirements - Part III". The Plumbing Section of the Design Analysis shall include a completed form titled "Service Water Heating Compliance Documentation". The Electrical Section of the Design Analysis shall include an explanatory statement on how the requirements of ASHRAE 90.1-2007 Chapter 8 Power were met. The Electrical Section of the Design Analysis shall also include a completed form titled "Lighting Compliance Documentation".

3.5.5.2. Interim and Final Design submittals which address energy consuming systems, (heating, cooling, service hot water, lighting, power, etc.) must also include calculations in a separate Energy Conservation Section of the Design Analysis which demonstrate and document (a) the baseline energy consumption for the facility or facilities under contract, that would meet the requirements of ANSI/ASHRAE/IESNA Standard 90.1 and (b) the energy consumption of the facility or facilities under contract utilizing the materials and methods required by this construction contract. Use the USGBC Energy and Atmosphere (EA) Credit 1 compliance template / form or an equivalently detailed form for documenting compliance with the energy reduction requirements. This template / form is titled PERFORMANCE RATING METHOD and is available when the project is registered for LEED. The calculation methodology used for this documentation and analysis shall follow the guidelines set forth in Appendix G of ASHRAE 90.1, with two exceptions: a) receptacle and process loads may be omitted from the calculation; and b) the definition of the terms in the formula for Percentage Improvement found in paragraph G1.2 are modified as follows: Baseline Building Performance shall mean the annual energy consumption calculated for a building design intended for use as a baseline for rating above standard design meeting the minimum requirements of the energy standard, and Proposed Building Performance shall mean annual energy consumption calculated for the proposed building design intended for construction. This calculation shall address all energy consuming systems in a single integrated methodology. Include laboratory fume hoods and kitchen ventilation loads in the energy calculation. They are not considered process loads. Individual calculations for heating, cooling, power, lighting, power, etc. systems will not be acceptable. The following building simulation software is acceptable for use in calculating building energy consumption: Hourly Analysis Program (HAP) by Carrier Corp., TRACE 700 by Trane Corp., DOE-2 by US Department of Energy, EnergyPlus by DOD/DOE.

### 3.5.6. Specifications

Specifications may be any one of the major, well known master guide specification sources (use only one source) such as MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specification Institute or Unified Facility Guide Specifications (UFGS using MASTERFORMAT 2004 numbering system), etc. (including specifications from these sources). Manufacturers' product specifications, utilizing CSI's Manu-Spec, three part format may be used in conjunction with the selected specifications. The designers of record shall edit and expand the appropriate Specifications to insure that all project design requirements, current code requirements, and regulatory requirements are met. Specifications shall clearly identify, where appropriate, specific products chosen to meet the contract requirements (i.e., manufacturers' brand names and model numbers or similar product information).

### 3.5.7. Building Rendering

Present and provide a draft color computer, artist, or hand drawn rendering with the conceptual design submittal of the building exterior. Perspective renderings shall include a slightly overhead view of the entire building to encompass elevations and the roof configuration of the building. After Government review and acceptance, provide a final rendering, including the following:

Three (3) 18" x 24" color prints, framed and matted behind glass with project title underneath the print.

One (1) Image file (high resolution) in JPG format on CD for those in the submittal distribution list.

### 3.5.8. Interim Building Design Contents

The following list represents what the Government considers should be included in the overall completed design for a facility or project. It is not intended to limit the contractor from providing different or additional information as needed to support the design presented, including the required design analyses discussed above. As the Contractor develops individual design packages and submits them for Interim review, include as much of the applicable information for an individual design package as is developed at the Interim design level for review purposes. These pieces shall be developed as the design progresses toward the design complete stage.

#### 3.5.8.1. Lawn and Landscaping Irrigation System

#### 3.5.8.2. Landscape, Planting and Turfing

#### 3.5.8.3. Architectural

- (a) Design Narrative
- (b) Architectural Floor Plans, Typical Wall and Roof Sections, Elevations
- (c) Finish schedule
- (d) All required equipment
- (e) Special graphics requirements
- (f) Door and Window Schedules
- (g) Hardware sets using BHMA designations
- (h) Composite floor plan showing all pre-wired workstations
- (i) Structural Interior Design (SID) package: See ATTACHMENT A for specific requirements
- (j) Furniture, Fixtures & Equipment (FF&E) design package: See ATTACHMENT B for specific requirements
- (k) Air Barrier Design: Details of all Air Barrier components, (i.e. window flashing details, penetrations in air barrier details, door flashing details, roofing/ceiling barrier interface details and etc.)

#### 3.5.8.4. Structural Systems. Include:

- (a) Drawings showing principal members for roof and floor framing plans as applicable
- (b) Foundation plan showing main foundation elements where applicable
- (c) Typical sections for roof, floor, and foundation conditions

#### 3.5.8.5. Plumbing Systems

- (a) Show locations and general arrangement of plumbing fixtures and major equipment
- (b) Plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping. Include natural gas (and meter as required), (natural gas and meter as required), (LP gas), (fuel oil) and other specialty systems as applicable.
- (c) Include equipment and fixture connection schedules with descriptions, capacities, locations, connection sizes and other information as required

#### 3.5.8.6. HVAC Systems

- (a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:
  - (1) Room designations.
  - (2) Mechanical legend and applicable notes.
  - (3) Location and size of all ductwork and piping.
  - (4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).
  - (5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)
  - (6) Paint Preparation Area (where applicable to project scope)

- (7) Exhaust fans and specialized exhaust systems.
- (8) Thermostat location.
- (9) Location of heating/cooling plant (i.e., boiler, chiller, cooling tower, etc).
- (10) Location of all air handling equipment.
- (11) Air balancing information.
- (12) Flue size and location.
- (13) Piping diagram for forced hot water system (if used).
- (b) Equipment Schedule: Provide complete equipment schedules. Include:
  - (1) Capacity
  - (2) Electrical characteristics
  - (3) Efficiency (if applicable)
  - (4) Manufacturer's name
  - (5) Optional features to be provided
  - (6) Physical size
  - (7) Minimum maintenance clearances
- (a) Details: Provide construction details, sections, elevations, etc., only where required for clarification of methods and materials of design.
- (b) HVAC Controls: Submit complete HVAC controls equipment schedules, sequences of operation, wiring and logic diagrams, Input/Output Tables, equipment schedules, and all associated information. See the Statement of Work for additional specific requirements.

#### 3.5.8.7. Fire Protection and Life Safety.

- (a) Provide plan for each floor of each building that presents a compendium of the total fire protection features being incorporated into the design. Include the following types of information:
  - (1) The location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc.
  - (2) The location and coverage of any fire detection systems
  - (3) The location and coverage of any fire suppression systems (sprinkler risers, standpipes, etc.)
  - (4) The location of any other major fire protection equipment
  - (5) Indicate any hazardous areas and their classification
  - (6) Schedule describing the internal systems with the following information: fire hazard and occupancy classifications, building construction type, GPM/square foot sprinkler density, area of operation and other as required
- (b) Working plans and all other materials submitted shall meet NFPA 13 requirements, with respect to required minimum level of detail.

#### 3.5.8.8. Elevators. Provide:

- (a) Description of the proposed control system
- (b) Description, approximate capacity and location of any special mechanical equipment for elevators.

#### 3.5.8.9. Electrical Systems.

- (a) Electrical Floor Plan(s): Show all principle architectural features of the building which will affect the electrical design. Show the following:
  - (1) Room designations.



- (2) Electrical legend and applicable notes.
- (3) Lighting fixtures, properly identified.
- (4) Switches for control of lighting.
- (5) Receptacles.
- (6) Location and designation of panelboards. Clearly indicate type of mounting required (flush or surface) and reflect accordingly in specifications.
- (7) Service entrance (conduit and main disconnect).
- (8) Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.
- (b) Building Riser Diagram(s) (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.
- (c) Load Center Panelboard Schedule(s): Indicate the following information:
  - (1) Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting).
  - (2) Branch Circuit Designations.
  - (3) Load Designations.
  - (4) Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)
  - (5) Branch Circuit Connected Loads (AMPS).
  - (6) Special Features
- (d) Lighting Fixture Schedule(s): Indicate the following information:
  - (1) Fixture Designation.
  - (2) General Fixture Description.
  - (3) Number and Type of Lamp(s).
  - (4) Type of Mounting.
  - (5) Special Features.
- (e) Details: Provide construction details, sections, elevations, etc. only where required for clarification of methods and materials of design.

3.5.8.10. Electronic Systems including the following responsibilities:

- (a) Fire Detection and Alarm System. Design shall include layout drawings for all devices and a riser diagram showing the control panel, annunciator panel, all zones, radio transmitter and interfaces to other systems (HVAC, sprinkler, etc.)
- (b) Fire Suppression System Control. Specify all components of the Fire Suppression (FS) System in the FS section of the specifications. Clearly describe how the system will operate and interact with other systems such as the fire alarm system. Include a riser diagram on the drawings showing principal components and interconnections with other systems. Include FS system components on drawing legend. Designate all components shown on floor plans "FS system components" (as opposed to "Fire Alarm components"). Show location of FS control panels, HVAC control devices, sensors, and 120V power panel connections on floor plans. Indicate zoning of areas by numbers (1, 2, 3) and detectors sub-zoned for cross zoning by letter designations (A and B). Differentiate between ceiling mounted and under floor detectors with distinct symbols and indicate sub-zone of each.
- (c) Public Address System
- (d) Special Grounding Systems. Completely reflect all design requirements in the specifications and drawings. Specifications shall require field tests (in the construction phase), witnessed by the Government, to determine the effectiveness of the grounding system. Include drawings showing existing construction, if any.
- (e) Cathodic Protection.

- (f) Intrusion Detection, Card Access System
- (g) Central Control and Monitoring System
- (h) Mass Notification System
- (i) Electrical Power Distribution Systems

3.5.8.11. Separate detailed Telecommunications drawings for Information Systems including the following responsibilities:

- (a) Telecommunications Cabling
- (b) Supporting Infrastructure
- (c) Outside Plant (OSP) Cabling - Campus or Site Plans - Exterior Pathways and Inter-Building Backbones
- (d) Include a layout of the voice/data outlets (including voice only wall & pay phones) on telecommunication floor plan drawing, location of SIPRNET data outlets (where applicable), and a legend and symbol definition to indicate height above finished floor. Show size of conduit and cable type and size on Riser Diagram. Do not show conduit runs between backboard and outlets on the floor plans. Show underground distribution conduit and cable with sizing from point of presence to entrance facility of building.
- (e) Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways including Serving Zones Drawings - Drop Locations and Cable ID's
- (f) Communication Equipment Rooms - Plan Views - Tech and AMEP/Elevations - Racks and Walls. Elevations with a detailed look at all telecomm rooms. Indicate technology layout (racks, ladder-racks, etc.), mechanical/electrical layout, rack elevation and backboard elevation. They may also be an enlargement of a congested area of T1 or T2 series drawing.

### 3.6. FINAL DESIGN REVIEWS AND CONFERENCES

A final design review and review conference will be held upon completion of final design at the project installation, or – where equipment is available - by video teleconference or a combination thereof, for any design package to receive Government acceptance to allow release of the design package for construction. For smaller separate design packages, the parties may agree on alternative reviews and conferences (e.g., conference calls and electronic file sharing, etc.) through the Partnering process. Include the final design conference in the project schedule and shall indicate what part of the design work is at 100% completion. The final design conference will be held after the Government has had seven (7) calendar days after receipt of the submission to review the final design package and supporting data. For smaller packages, especially those involving only one or a few design disciplines the parties may agree on a shorter period.

### 3.7. FINAL DESIGN REQUIREMENTS

Final design deliverables for a design package shall consist of 100% complete drawings, specifications, submittal register and design analyses for Government review and acceptance. The 100% design submission shall consist of drawings, specifications, updated design analyses and any permits required by the contract for each package submitted. In order to expedite the final design review, prior to the conference, ensure that the design configuration management data and all review comment resolutions are up-to-date. Include the 100% SID and 100% FF&E binders for government approval. The Contractor shall have performed independent technical reviews (ITR's) and back-checks of previous comment resolutions, as required by Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL, including providing documentation thereof. Use DrChecks or other acceptable comment tracking system during the ITR and submit the results with each final design package

#### 3.7.1. Drawings

3.7.1.1. Submit drawings complete with all contract requirements incorporated into the documents to provide a 100% design for each package submitted.

3.7.1.2. Prepare all drawings with the Computer-Aided Design and Drafting (CADD)/Computer-Aided Design (CAD) system, organized and easily referenced electronically, presenting complete construction information.

3.7.1.3. Drawings shall be complete. The Contractor is encouraged to utilize graphics, views, notes, and details which make the drawings easier to review or to construct but is also encouraged to keep such materials to those that are necessary.

3.7.1.4. Provide detail drawings that illustrate conformance with the contract. Include room finish schedules, corresponding color/finish/special items schedules, and exterior finish schedules that agree with the submitted SID binders.

3.7.1.5. The design documents shall be in compliance with the latest version of the A/E/C CAD Standard, available at <https://cadbim.usace.army.mil/CAD>. Use the approved vertical Corps of Engineers title blocks and borders on all drawings with the appropriate firm name included within the title block area.

3.7.1.6. CAD System and Building Information Modeling (BIM) (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order.)

All CAD files shall be fully compatible with MicroStation V8 or higher. Save all design CAD files as MicroStation V8 or higher files. All submitted BIM Models and associated Facility Data shall be fully compatible with Bentley BIM file format and the USACE Bentley BIM v8 Workspace.

(a) CAD Data Final File Format: During the design development capture geo-referenced coordinates of all changes made to the existing site (facility footprint, utility line installations and alterations, roads, parking areas, etc) as a result of this contract. There is no mandatory methodology for how the geo-referenced coordinates will be captured, however, Engineering and Construction Bulletin No. 2006-15, Subject: Standardizing Computer Aided Design (CAD) and Geographic Information Systems (GIS) Deliverables for all Military Design and Construction Projects identifies the format for final as-built drawings and data sets to be delivered to the government. Close-out requirements at the as-built stage; require final geo-referenced GIS Database of the new facility along with all exterior modifications. The Government will incorporate this data set into the Installation's GIS Masterplan or Enterprise GIS System. See also, Section 01 78 02.00 10 Closeout Submittals.

(b) Electronic Drawing Files: In addition to the native CAD design files, provide separate electronic drawing files (in editable CAD format and Adobe Acrobat PDF version 7.0 or higher) for each project drawing.

(c) Each file (both CAD and PDF) shall represent one complete drawing from the drawing set, including the date, submittal phase, and border. Each drawing file shall be completely independent of any data in any other file, including fonts and shapes not included with the basic CAD software program utilized. Fonts that are not included as part of the default CAD software package installation or recognized as an allowable font by the A/E/C CAD Standard are not acceptable in delivered CAD files. All displayed graphic elements on all levels of the drawing files shall be part of the project drawing image. The drawing files shall not contain any graphic element that is not part of the drawing image.

(d) Deliver BIM Model and associated Facility Data files in their native format. At a minimum, BIM files shall address major architecture design elements, major structural components, mechanical systems and electrical/communication distribution and elements as defined in Attachment F. See Attachment F for additional BIM requirements.

(e) Drawing Index: Provide an index of drawings sheet in CAD as part of the drawing set, and an electronic list in Microsoft Excel of all drawings on the CD. Include the electronic file name, the sheet reference number, the sheet number, and the sheet title, containing the data for each drawing.

(f) Hard Copies: Plot submitted hard copy drawings directly from the "electronic drawing files" and copy for quantities and sizes indicated in the distribution list at the end of this specification section. The Designers of Record shall stamp, sign and date original hard copy sheets as Released For Construction, and provide copies for distribution from this set.

### 3.7.2. Design Analyses

3.7.2.1. The designers of record shall update, finalize and present design analyses with calculations necessary to substantiate and support all design documents submitted.

3.7.2.2. The responsible DOR shall stamp, sign and date the design analysis. Identify the software used where, applicable (name, version, vendor). Generally, provide design analyses, individually, in an original (file copy) and one copy for the assigned government reviewer.

3.7.2.3. All disciplines review the LEED design analysis in conjunction with their discipline-specific design analysis; include a copy of the separable LEED design analysis in all design analysis submittals.

3.7.2.4. Do not combine multi-disciplined volumes of design-analysis, unless multiple copies are provided to facilitate multiple reviewers (one copy per each separate design analysis included in a volume).

### 3.7.3. Specifications

Specifications shall be 100% complete and in final form.

### 3.7.4. Submittal Register

Prepare and update the Submittal Register and submit it with the 100% design specifications (see Specification Section 01 33 00, SUBMITTAL PROCEDURES) with each design package. Include the required submittals for each specification section in a design package in the submittal register.

### 3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

This form itemizes the types, quantities and costs of various equipment and systems that comprise the project, for the purpose of transferring the new construction project from the Corps Construction Division to the Installation's inventory of real property. The Government will furnish the DB Contractor's design manager a DD Form 1354 checklist to use to produce a draft Form 1354. Submit the completed checklist and prepared draft Form DD 1354 with the 100% design in the Design Analysis. The Corps will use these documents to complete the final DD 1354 upon completion of construction.

### 3.7.6. Acceptance and Release for Construction

3.7.6.1. At the conclusion of the Final Design Review (after resolutions to the comments have been agreed upon between DOR and Government reviewers), the Contracting Officer or the ACO will accept the Final Design Submission for the design package in writing and allow construction to start for that design package. The Government may withhold acceptance until all major corrections have been made or if the final design submission requires so many corrections, even though minor, that it isn't considered acceptably complete.

3.7.6.2. Government review and acceptance of design submittals is for contract conformance only and shall not relieve the Contractor from responsibility to fully adhere to the requirements of the contract, including the Contractor's accepted contract proposal, or limit the Contractor's responsibility of design as prescribed under Special Contract Requirement: "Responsibility of the Contractor for Design" or limit the Government's rights under the terms of the contract. The Government reserves the right to rescind inadvertent acceptance of design submittals containing contract deviations not separately and expressly identified in the submittal for Government consideration and approval.

## 3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

After the Final Design Submission and Review Conference and after Government acceptance of the Final Design submission, revise the design documents for the design package to incorporate the comments generated and resolved in the final review conference, perform and document a back-check review and submit the final, design complete documents. Label the final design complete documents "FOR CONSTRUCTION" or use similar language. In addition to the final drawings and specifications, the following deliverables are required for distribution and field use. The deliverable includes all documentation and supporting design analysis in final form, as well as the final review comments, disposition and the back-check. As part of the quality assurance process, the Government may perform a back-check of the released for construction documentation. Promptly correct any errors or omissions found during the Government back-check. The Government may withhold retainage from progress payments for work or materials associated with a final design package until this submittal has been received and the Government determines that it is complete.

## 3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

### 3.9.1. Submittal Distribution and Quantities

General: The documents which the Contractor shall submit to the Government for each submittal are listed and generally described in preceding paragraphs in this Section. Provide copies of each design submittal and design substantiation as follows (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order):

Activity and Address	Drawing Size (Full Size) <b>Full</b> Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) <b>Half</b> Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF & <u>.dgn</u> )	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attach F)
Commander, U.S.Army Engineer District <b>US Army Engineer District, Fort Worth</b>	1/0	6/0	5/0	2	1	2	2
Commander, U.S.Army Engineer District, Center of Standardization <b>Savannah, GA</b>	1/0	3/0	2/0	0	N/A	0	1
Installation	1/0	6/0	5/0	1	2	2	0
U.S.Army Corps of Engineers Construction Area Office	1/0	3/0	3/0	2	1	2	0
Information Systems Engineering Command (ISEC)	0/0	0/1	0/0	1	N/A	N/A	1
Other Offices	0/0	0/0	0/0	0	N/A	0	0

**\*NOTE: For partial sets of drawings, specifications and design analyses, see paragraph 3.9.3.3, below.**

**\*\*NOTE: When specified below in 3.9.2, furnish Installation copies of Drawings as paper copies, in lieu of the option to provide secure web-based submittals.**

### 3.9.2. Web based Design Submittals

Web based design submittals will be acceptable as an alternative to the paper copies listed in the Table above, provided a single hard-copy PDF based record set is provided to the Contracting Officer for record purposes. Where the contract requires the Contractor to submit documents to permitting authorities, still provide those authorities paper copies (or in an alternate format where required by the authority). Web based design submittal information shall be provided with adequate security and availability to allow unlimited access those specifically authorized to Government reviewers while preventing unauthorized access or modification. File sizes must be of

manageable size for reviewers to quickly download or open on their computers. As a minimum, drawings shall be full scale on American National Standards Institute (ANSI) D sheets (34" x 22"). In addition to the optional website, provide the BIM data submission on DVD to each activity and address noted above in paragraph 3.9.1 for each BIM submission required in Attachment F.

### 3.9.3. Mailing of Design Submittals

3.9.3.1. Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract (or individual task order if this is an indefinite delivery/indefinite quantity, task order contract). Mail the submittals to five (5) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

3.9.3.2. Each design submittal shall have a transmittal letter accompanying it indicating the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

3.9.3.3. Provide partial sets of drawings, specifications, design analyses, etc., as designated in the Table in paragraph 3.9.1, to those reviewers who only need to review their applicable portions of the design, such as the various utilities. The details of which office receives what portion of the design documentation will be worked out after award.

### 3.10. AS-BUILT DOCUMENTS

Provide as-built drawings and specifications in accordance with Section 01 78 02.00 10, CLOSEOUT SUBMITTALS. Update LEED design phase documentation during construction as needed to reflect construction changes and advancing project completion status (example - Commissioning Plan updates during construction phase) and include updated LEED documentation in construction closeout submittal.

## **ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS**

### **1.0 GENERAL INFORMATION**

Structural Interior Design includes all building related elements and components generally part of the building itself, such as wall finishes, ceilings finishes, floor coverings, marker/bulletin boards, blinds, signage and built in casework. Develop the SID in conjunction with the furniture footprint.

### **2.0 STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS**

#### **2.1. FORMAT AND SCHEDULE**

Prepare and submit for approval an interior and exterior building finishes scheme for an interim design submittal. The DOR shall meet with and discuss the finish schemes with the appropriate Government officials prior to preparation of the schemes to be presented. Present original sets of the schemes to reviewers at an interim design conference.

At the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers, the Contractor may proceed to final design with the interior finishes scheme presented.

The SID information and samples are to be submitted in 8 ½" x 11" format using three ring binders with pockets on the inside of the cover. When there are numerous pages with thick samples, use more than one binder. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 ½". Provide cover and spine inserts sheets identifying the document as "Structural Interior Design" package. Include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Design submittal requirements include, but are not limited to:

##### **2.1.1. Narrative of the Structural Interior Design Objectives**

The SID shall include a narrative that discusses the building related finishes. Include topics that relate to base standards, life safety, sustainable design issues, aesthetics, durability and maintainability, discuss the development and features as they relate to the occupants requirements and the building design.

##### **2.1.2. Interior Color Boards**

Identify and key each item on the color boards to the contract documents to provide a clear indication of how and where each item will be used. Arrange finish samples to the maximum extent possible by room type in order to illustrate room color coordination. Label all samples on the color boards with the manufacturer's name, patterns and colors name and number. Key or code samples to match key code system used on contract drawings.

Material and finish samples shall indicate true pattern, color and texture. Provide photographs or colored photocopies of materials or fabrics to show large overall patterns in conjunction with actual samples to show the actual colors. Finish samples must be large enough to show a complete pattern or design where practical.

Color boards shall include but not be limited to original color samples of the following:

All walls finishes and ceiling finishes, including corner guards, acrylic wainscoting and wall guards/chair rail finishes

All tile information, including tile grout color and tile patterns.

- All flooring finishes, including patterns.
- All door, door frame finishes and door hardware finishes
- All signage, wall base, toilet partitions, locker finishes and operable/folding partitions and trim

- All millwork materials and finishes (cabinets, counter tops, etc.)
- All window frame finishes and window treatments (sills, blinds, etc.)

Color board samples shall reflect all actual finish textures, patterns and colors required as specified. Patterned samples shall be of sufficient size to adequately show pattern and its repeat if a repeat occurs.

#### 2.1.3. Exterior Color Boards

Prepare exterior finishes color boards in similar format as the interior finishes color boards, for presentation to the reviewers during an interim design conference. Provide original color samples of all exterior finishes including but not limited to the following:

- All Roof Finishes
- All Brick and Cast Stone Samples
- All Exterior Insulation and Finish Samples
- All Glass Color Samples
- All Exterior Metals Finishes
- All Window & Door Frame Finishes
- All Specialty Item Finishes, including trim

Identify each item on the exterior finishes color boards and key to the building elevations to provide a clear indication of how and where each item will be used.

### 2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

#### 2.2.1. General

Structural interior design related drawings must indicate the placement of extents of SID material, finishes and colors and must be sufficiently detailed to define all interior work. The following is a list of minimum requirements:

#### 2.2.2. Finish Color Schedule

Provide finish color schedule(s) in the contract documents. Provide a finish code, material type, manufacturer, series, and color designations. Key the finish code to the color board samples and drawings.

#### 2.2.3. Interior Finish Plans

Indicate wall and floor patterns and color placement, material transitions and extents of interior finishes.

#### 2.2.4. Furniture Footprint Plans

Provide furniture footprint plans showing the outline of all freestanding and systems furniture for coordination of all other disciplines.

#### 2.2.5. Interior Signage

Include interior signage plans or schedules showing location and quantities of all interior signage. Key each interior sign to a quantitative list indicating size, quantity of each type and signage text.

#### 2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.



## **ATTACHMENT B FURNITURE, FIXTURES & EQUIPMENT (FF&E) REQUIREMENTS**

### **1.0 FF&E REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS**

#### **1.1. FORMAT AND SCHEDULE**

Prepare and submit for approval a comprehensive FF&E scheme for an interim design submittal. The Contractor's interior designer, not a furniture dealer, shall develop the design. FF&E is the selection, layout, specification and documentation of furniture includes but is not limited to workstations, seating, tables, storage and shelving, filing, trash receptacles, clocks, framed artwork, artificial plants, and other accessories. Contract documentation is required to facilitate pricing, procurement and installation. The FF&E package is based on the furniture footprint developed in the Structural Interior Design (SID) portion of the interior design. Develop the FF&E package concurrently with the building design to ensure that there is coordination between the electrical outlets, switches, J-boxes, communication outlets and connections, and lighting as appropriate. In addition, coordinate layout with other building features such as architectural elements, thermostats, location of TV's, GF/GI equipment (for example computers, printers, copiers, shredders, faxes), etc. Locate furniture in front of windows only if the top of the item falls below the window and unless otherwise noted, do not attach furniture including furniture systems to the building. If project has SIPRNET and/or NIPRNET, coordinate furniture layout with SIPRNET and NIPRNET separation requirements. Verify that access required by DOIM for SIPRNET box and conduit is provided. The DOR shall interview appropriate Government personnel to determine FF&E requirements for furniture and furnishings prior to preparation of the scheme to be presented. Determine FFE items and quantities by, but not limited to: (1) the number of personnel to occupy the building, (2) job functions and related furniture/office equipment to support the job function, (3) room functions, (4) rank and grade. Present original sets of the scheme to reviewers at an interim design conference upon completion of the interim architectural submittal or three months prior to the submittal of the final FF&E package (whichever comes first).

Design may proceed to final with the FF&E scheme presented at the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers.

Provide six copies of the electronic versions of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide unbound, electronic drawings in CAD and BIM. Provide all files needed to view complete drawings. Submit all text documents in Microsoft Word or Excel..

Submit four copies of the final and complete FF&E information and samples in 8 1/2" x 11" format using three ring binders with pockets on the inside of the cover upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first). Use more than one binder when there are numerous pages with thick samples. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out for upholstery and finish boards. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 1/2". Provide cover and spine inserts sheets identifying the document as "Furniture, Fixtures & Equipment" package and include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Provide electronic copies of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide six compact disks with all drawings files needed to view the complete drawings unbound and in the latest version AutoCAD. Provide six additional compact disks of all text documents in Microsoft Word or Excel.

Design submittal requirements include, but are not limited to:

##### **1.1.1. Narrative of Interior Design Objectives**

Provide a narrative description of the furniture, to include functional, safety and ergonomic considerations, durability, sustainability, aesthetics, and compatibility with the building design.

##### **1.1.2. Furniture Order Form**

Prepare one Furnishings Order Form for each item specified in the design. This form identifies all information required to order each individual item. In addition to the project name and location, project number, and submittal phase, the order form must include:

- (a) Furniture item illustration and code
- (b) Furniture item name
- (c) Job name, location, and date
- (d) General Services Administration (GSA) FSC Group, part, and section
- (e) Manufacturer, Product name and Product model number or National Stock Number (NSN)
- (f) Finish name and number (code to finish samples)
- (g) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)
- (h) Dimensions
- (i) Item location by room number and room name
- (j) Quantity per room
- (k) Total quantity
- (l) Special instructions for procurement ordering and/or installation (if applicable)
- (m) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:
  - (1) required features and characteristics
  - (2) ergonomic requirements
  - (3) functional requirements
  - (4) testing requirements
  - (5) furniture style
  - (6) construction materials
  - (7) minimum warranty

The following is an example for “m” features and characteristics, ergonomic requirements and functional requirements:

Chair Description:

- (1) Mid-Back Ergonomic Task Chair
- (2) Pneumatic Gaslift; Five Star Base
- (3) Mesh Back; Upholstered Seat
- (4) Height and Width Adjustable Task Arms:
  - a. Arm Height: 6”- 11” (+-1/2”)
  - b. Arm Width: 2”– 4” adjustment
- (5) Height Adjustable Lumbar Support
- (6) Adjustable Seat Height 16”-21” (+- 1”)
- (7) Sliding Seat Depth Adjustment 15”-18” (+-1”)
- (8) Standard Hard Casters (for carpeted areas)
- (9) Overall Measurements:
  - a. Overall width: 25” - 27”
  - b. Overall depth: 25”– 28”

(10) Must have a minimum of the following adjustments (In addition to the above):

- a. 360 Degree Swivel
- b. Knee-Tilt with Tilt Tension
- c. Back angle
- d. Forward Tilt
- e. Forward Tilt and Upright Tilt Lock

For projects with systems furniture, also provide a written description of the following minimum requirements:

- (1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)
- (2) Minimum noise reduction coefficient (NRC)
- (3) Minimum sound transfer coefficient (STC)
- (4) Minimum flame spread and smoke development
- (5) UL testing for task lighting and electrical system
- (6) Panel widths and heights and their locations (this may be done on the drawings) Worksurface types and sizes (this may be done on the drawings)
- (7) Worksurface edge type
- (8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)
- (9) Storage requirements
- (10) Keyboard requirements
- (11) Lock and keying requirements
- (12) Accessory components (examples: tack boards, marker boards, paper management)
- (13) Electrical and communication raceway requirement; type, capacity and location (base, beltline, below and/or above beltline)
- (14) Locations of communication cables (base, beltline, below and/or above beltline, top channel)
- (15) Types of electrical outlets
- (16) Types of communication jacks; provided and installed by others
- (17) Locations of electrical outlets and communication jacks (this may be done on the drawings)
- (18) Type of cable (examples: Cat. 5, Cat. 6, fiber optic; UTP or STP, etc.) system needs to support; provided and installed by others

#### 1.1.3. Alternate Manufacturer List

Provide a table consisting of major furniture items that lists the manufacturers products specified on the Order Form and two alternate manufacturers. Major furniture items include, but are not limited to, casegoods, furniture systems, seating, and tables. Organize matrix by item code and item name. Supply alternates that are available on GSA Schedule and meet the requirements of the Furniture Order Form. One of the two alternates must be from UNICOR if possible. Provide manufacturer name address, telephone number, product series and product name for each alternate manufacturer.

#### 1.1.4. FF&E Procurement List

Provide a table that lists all FF&E furniture, mission unique equipment and building Contractor Furnished/Contractor Installed (CF/CI) items. Give each item a code and name and designate whether item will be procured as part of the FF&E furniture, mission unique equipment or the building construction contract. Use the item code to key all FF&E documents including location plans, color boards, data sheets, cost estimate, etc.

#### 1.1.5. Points of Contact (POCs)

Provide a comprehensive list of POCs needed to implement the FF&E package. This would include but not be limited to appropriate project team members, using activity contacts, interior design representatives, construction contractors and installers involved in the project. In addition to name, address, phone, fax and email, include each contact's job function. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

#### 1.1.6. Color Boards

Provide color boards for all finishes and fabrics for all FF&E items. Finishes to be included but not limited to paint, laminate, wood finish, fabric, etc.

#### 1.1.7. Itemized Furniture Cost Estimate

Provide an itemized cost estimate of furnishings keyed to the plans and specifications of products included in the package. This cost estimate should be based on GSA price schedules. The cost estimate must include separate line items for general contingency, installation, electrical hook-up for systems furniture or other furniture requiring hardwiring by a licensed electrician, freight charges and any other related costs. Installation and freight quotes from vendors should be use in lieu of a percentage allowance when available. Include a written statement that the pricing is based on GSA schedules. An estimate developed by a furniture dealership may be provided as support information for the estimate, but must be separate from the contractor provided estimate.

### 1.2. INTERIOR DESIGN DOCUMENTS

#### 1.2.1. Overall Furniture and Area Plans

Provide floor Plans showing locations and quantities of all freestanding, and workstation furniture proposed for each floor of the building. Key each room to a large scale Furniture Placement Plan showing the furniture configuration, of all furniture. Provide enlarged area plans with a key plan identifying the area in which the building is located. Key all the items on the drawings by furniture item code. Do not provide manufacturer specific information such as product names and numbers on drawings, Drawings shall be non-proprietary. This is typical for FFE on all plans, including those mentioned below.

#### 1.2.2. Workstation Plans

Show each typical workstation configuration in plan view, elevations or isometric view. Drawings shall illustrate panels and all major components for each typical workstation configuration. Identify workstations using the same numbering system as shown on the project drawings. Key components to a legend on each sheet which identifies and describes the components along with dimensions. Provide the plan, elevations and isometric of each typical workstation together on the same drawing sheet.

#### 1.2.3. Panel Plans

Show panel locations and critical dimensions from finished face of walls, columns, panels including clearances and aisle widths. Key panel assemblies to a legend which shall include width, height, configuration of frames, panel fabric and finishes (if there are different selections existing within a project), powered or non-powered panel and wall mount locations.

#### 1.2.4. Desk Plans

Provide typical free standing desk configurations in plan view, elevation or isometric view and identify components to clearly represent each desk configuration.

#### 1.2.5. Reflected Ceiling Plans

Provide typical plans showing ceiling finishes and heights, lighting fixtures, heating ventilation and air conditioning supply and return, and sprinkler head placement for coordination of furniture.

#### 1.2.6. Electrical and Telecommunication Plans

Show power provisions including type and locations of feeder components, activated outlets and other electrical components. Show locations and quantities of outlets for workstations. Clearly identify different outlets, i.e. electrical, LAN and telecommunication receptacles indicating each type proposed. Show wiring configuration, (circuiting, switching, internal and external connections) and provide as applicable.

#### 1.2.7. Artwork Placement Plans

Provide an Artwork Placement Plan to show location of artwork, assign an artwork item code to each piece of artwork. As an alternative, artwork can be located on the Furniture Plans. Provide a schedule that identifies each piece by room name and number. Provide installation instructions; include mounting height.

#### 1.2.8. Window Drapery Plans

Provide Interior Window Drapery Plans. Key each drapery treatment to a schedule showing color, pattern, material, drapery size and type, draw direction, location and quantities.

### 1.3. FURNITURE SELECTION

1.3.1. Select furniture from the GSA Schedules. Specify furniture available open market when an item is not available on the GSA Schedules. Provide justification for items not available on the GSA Schedules.

1.3.2. To the greatest extent possible when specifying furniture work within a manufacturer's family of furniture for selections, example: Steelcase, Turnstone, Brayton International, Metro, and Vecta are all Steelcase companies. Each alternate should also be specified from a manufacturer's family of furniture, example: first set of alternates would be specified from Knoll's family of furniture and the second from Herman Miller family of furniture. It may be necessary to make some selections from other than a manufacturer's family of furniture if costs are not reasonable for particular items, some items are not available or appropriate for the facility or the items are not on GSA Schedule. If this occurs, consider specifying product from an open line that is accessible by numerous dealerships. Select office furniture including case goods, tables, storage, seating, etc. that is compatible in style, finish and color. Select furniture that complies with ANSI/BIFMA and from manufacturer's standard product line as shown in the most recent published price list and/or amendment and not custom product.

### 1.4. CONSTRUCTION

1.4.1. Provide knee space at workstations and tables that is not obstructed by panels/legs that interfere with knee space of seated person and specify modesty panels at walls to be of a height or be hinged to allow access to building wall electrical outlets and communication jacks. Provide desks, storage and tables with leveling devices to compensate for uneven floors.

1.4.2. Specify workstations and storage of steel construction. Provide worksurface tops constructed to prevent warpage. Provide user friendly features such as radius edges. Do not use sharp edges and exposed connections and ensure the underside of desks, tables and worksurfaces are completely and smoothly finished. Provide abutting worksurfaces that mate closely and are of equal heights when used in side-by-side configurations in order to provide a continuous and level worksurface.

1.4.3. Drawers shall stay securely closed when in the closed position and protect wires from damage during drawer operation. Include a safety catch to prevent accidental removal when fully open

1.4.4. Unless otherwise noted, provide lockable desks and workstations, filing cabinets and storage. Key all locks within a one person office the same; key all one person offices within a building differently. If an office or open office area has more than one workstation, key all the workstations differently, but key all locks within an individual workstation the same. Use tempered glass glazing when glazing is required. Use light-emitting diode (LED)/solid state lighting where task lighting is required in furniture.

### 1.5. FINISHES AND UPHOLSTERY

1.5.1. Specify neutral colors for casegoods, furniture systems, storage and tables. Specify desk worksurfaces and table tops that are not too light or too dark in color and have a pattern to help hide soiling. Accent colors are

allowed in break and lounge areas. Keep placement of furniture systems panel fabric accent colors to a minimum. All finishes shall be cleanable with ordinary household cleaning solutions.

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Customers Own Material (COM) can be used in headquarter buildings in command suites with executive furniture. Coordinate specific locations with Corps of Engineers Interior Designer.

1.5.3. Specify seating upholstery that meets Wyzenbeek Abrasion Test, 55,000 minimum rubs. Specify a soil retardant finish for woven fabrics if Crypton or vinyl upholstery is not provided for seating in dining areas. Use manufacturer's standard fabrics. This includes textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Specify upholstery and finish colors and patterns that help hide soiling. Specify finishes that can be cleaned with ordinary household cleaning solutions.

## 1.6. ACCESSORIES

1.6.1. Specify all accessories required for completely finished furniture installation. Provide filing cabinets and storage for office supplies. Provide tack surfaces at workstations with overhead storage. Provide tackable surfaces at workstations with overhead storage.

1.6.2. Not Used.

1.6.3. Workstations are to be equipped with stable keyboard trays that have height adjustability, tilting capability, including negative tilt, have a mouse pad at same height as the keyboard tray that can accommodate both left and right handed users, and retractable under worksurface.

## 1.7. MISSION UNIQUE EQUIPMENT

Funding for FF&E furniture items and mission unique equipment (MUE) items are from two different sources. Separate the designs and procurement documentation for FFE items and MUE. MUE includes, but is not limited to, items such as industrial shelving, workbenches, appliances, fitness equipment, IT equipment and supporting carts. The User will purchase and install mission unique equipment items, unless otherwise noted. Identify locations of known MUE items such as industrial shelving, workbenches, appliances, etc. for space planning purposes.

## 1.8. SUSTAINABILITY

1.8.1. For all designs provided regardless of facility type, make every effort to implement all aspects of sustainability to the greatest extent possible for all the selections made in the FF&E package. This includes but is not limited to the selection of products that consider: **Material Chemistry and Safety of Inputs** (What chemicals are used in the construction of the selections?); **Recyclability** (Do the selections contain recycled content?); **Disassembly** (Can the selections be disassembled at the end of their useful life to recycle their materials?).

1.8.2. Make selections to the greatest extent possible of products that possess current McDonough Braungart Design Chemistry ([MBDC](#)) certification or other "third-party" certified Cradle to Cradle program, Forest Stewardship Council (FSC) certification, GREENGAURD certification or similar "third-party" certified products consisting of low-emitting materials.

## 1.9. FURNITURE SYSTEMS

1.9.1. General.

Where appropriate, design furniture systems in open office areas. Coordinate style and color of furniture systems with other storage, seating, etc. in open office areas. Minimize the number of workstation typicals and the parts and pieces required for the design to assist in future reconfiguration and inventorying.

1.9.2. Connector Systems.

Specify a connector system that allows removal of a single panel or spine wall within a typical workstation configuration without requiring disassembly of the workstation or removal of adjacent panels. Specify connector

system with tight connections and continuous visual seals. When Acoustical panels are used, provide connector system with continuous acoustical seals. Specify concealed clips, screws, and other construction elements, where possible.

#### 1.9.3. Panels and Spine Walls

Specify panels and spine walls with hinged or removable covers that permit easy access to the raceway when required but are securely mounted and cannot be accidentally dislodged under normal conditions. Panels shall be capable of structurally supporting more than 1 fully loaded component per panel per side. Raceways are to be an integral part of the panel and must be able to support lay-in cabling and have a large capacity for electrical and IT. Do not thread cables through the frame.

#### 1.9.4. Electrical And Information/Technology (IT)

Design furniture with electrical systems that meets requirements of UL 1286 when powered panels are required and UL approved task lights that meet requirements of NFPA 70. Dependent on user requirements and Section 01 10 00, paragraph 3 requirements, it is recommended that workstation electrical and IT wiring entry come from the building walls to eliminate the use of power poles and access at the floor. Design electrical and IT systems that are easily accessed in the spine wall and panels without having to move return panels and components. Electrical and IT management will be easily accessible by removable wall covers which can be removed while workstation components are still attached. Specify connector system that has continuation of electrical and IT wiring within workstations and workstation to workstation.

#### 1.9.5. Pedestals

Specify pedestals that are interchangeable from left to right, and right to left, and retain pedestal locking system capability.

### 1.10. EXECUTIVE FURNITURE

1.10.1. Design for executive furniture in command areas, coordinate specific locations with Corps of Engineers Interior Designer. Use upgraded furniture, upholsteries and finishes in command suites. This includes but is not limited to wood casegoods, seating and tables. Select executive furniture casegoods from a single manufacturer and style line, to include workstations, credenzas, filing, and storage, etc.

1.10.2. Specify furniture with wood veneer finish (except worksurfaces) with mitered solid wood edge of same wood type. Provide worksurface plastic laminate that closely matches adjacent wood veneer. Other executive office furniture such as seating, tables, executive conference room furniture, etc. shall be compatible in style, finish and color with executive furniture casegoods.

### 1.11. SEATING

#### 1.11.1. General

Specify appropriate chair casters and glides for the floor finish where the seating is located. Universal casters that are appropriate for both hard surface flooring and carpet are preferred. All seating shall support up to a minimum of 250 lbs.

#### 1.11.2. Desk and Guest Seating

Select ergonomic desk chairs with casters, non-upholstered adjustable arms, waterfall front, swivel, tilt, variable back lock, adjustable back height or adjustable lumbar support, pneumatic seat height adjustment, and padded, contoured upholstered seat and back. Desk and guest chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Depending on scale of desk chair provide seat pan forward and back adjustment to increase or decrease depth of seat pan. All desk chairs shall have an adjustable seat height range of 4 1/2", range to include 16 1/2-20". Select guest chairs that are compatible in style, finish and color with the desk chairs.

#### 1.11.3. Conference Room Seating

At tables, select ergonomic conference seating with casters, non-upholstered arms, waterfall front, swivel, tilt, pneumatic seat height adjustment, and padded, contoured seat and back, unless otherwise noted. Select arm height and/or design that allows seating to be moved up closely to the table top. Conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Perimeter conference chairs shall be compatible in style, finish and color with conference seating at the tables.

#### 1.11.4. Lounge, Waiting and Reception Area Seating

Select seating with arms and cushioned, upholstered seat and back. In heavy use areas, arms shall be easily cleaned such as non-upholstered arms or upholstered arms with wood arm caps unless otherwise noted.

#### 1.11.5. Break Room Seating

Select stackable seating that is easily cleaned. Seating shall be appropriate for table and counter heights as applicable with non-upholstered arms if arms are required. Chairs shall have metal legs and composite materials for seats.

#### 1.11.6. Lounge, Waiting and Reception Furniture.

Design for end and coffee tables with plastic laminate tops that are compatible in style finish and color with the seating.

#### 1.12. FILING AND STORAGE.

Select storage and shelving units that meet customer's functional load requirements for stored items. Specify counterweights for filing cabinets when required by the manufacturer for stability. File drawers shall allow only one drawer to be opened at a time. Provide heavy duty storage and shelving if information is not available.

#### 1.13. TRAINING TABLES.

Don't use plastic laminate self edge. Training tables shall be reconfigurable, moveable and storable; lighter weight folding with dollies or casters as necessary. Specify dollies if required.

#### 1.14. FURNITURE WARRANTIES.

Specify manufacturer's performance guarantees or warranties that include parts, labor and transportation as follows:

- Furniture System, unless otherwise noted – 10 year minimum
- Furniture System Task Lights – 2 year minimum, excluding bulbs
- Furniture System Fabric – 3 year minimum
- Desks - 10 year minimum
- Seating, unless otherwise noted - 10 year minimum
- Seating Mechanisms and Pneumatic Cylinders - 10 years
- Fabric - 3 years minimum
- Filing and Storage - 10 year minimum
- Tables, unless otherwise noted - 10 year minimum
- Table Mechanisms – 5 year
- Table Ganging Device - 1 year
- Items not listed above - 1 year minimum



## **ATTACHMENT C**

### **TRACKING COMMENTS IN DRCHECKS**

#### **1.0 General**

The Government and DB Contractor shall set up the project in Dr Checks. Throughout the design process, the parties shall enter, track, and back-check comments using the DrChecks system. Government reviewers enter design review comments into DrChecks. Designers of Record shall annotate comments timely and specifically to indicate exactly what action will be taken or why the action is not required. Comments considered critical by the conference participants shall be flagged as such.

#### **2.0 DrChecks Review Comments**

The Contractor and the Government shall monitor DrChecks to assure all comments are annotated and agreed to by the designers and reviewers prior to the next submittal. The DrChecks comments and responses shall be printed and included in the design analysis for record.

2.1. Conference participants (reviewers) will expect coordination between Design Analysis calculations and the submitted design. Reviewers will also focus on the design submittal's satisfaction of the contract requirements.

2.2. The Designers of Record shall answer each comment in DrChecks with a formal response prior to the next submittal, clearly indicating what action will be taken and what drawing/spec will change. Designers of Record are encouraged to directly contact reviewers to discuss and agree to the formal comment responses rather than relying only on DrChecks and review meetings to discuss comments. With the next design conference, reviewers will back-check answers to the comments against the submittal, in addition to reviewing additional design work.

2.3. Comments that, in the DB Contractor's opinion, require effort outside the scope of the contract shall be clearly indicated as such in DrChecks. The DB Contractor shall not proceed with work outside the contract until a modification to the contract is properly executed, if one is necessary.

#### **3.0 DrChecks Initial Account Set-Up**

To initialize an office's use of DrChecks, choose a contact person within the office to call the DrChecks Help Desk at 800-428-HELP, M-F, 8AM-5PM, Central time. This POC will be given an office password to distribute to others in the office. Individuals can then go to the hyperlink at <http://www.projnet.org> and register as a first time user. Upon registration, each user will be given a personal password to the DrChecks system.

3.1. Once the office and individuals are registered, the COE's project manager or lead reviewer will assign the individuals and/or offices to the specific project for review. At this point, persons assigned can make comments, annotate comments, and close comments, depending on their particular assignment.

#### **4.0 DrChecks Reviewer Role**

The Contractor is the technical reviewer and the Government is the compliance reviewer of the DB designers design documents. Each reviewer enters their own comments into the Dr Checks system. To enter comments:

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

4.3. Click on the appropriate review conference. An Add comment screen will appear.

4.4. Select or fill out the appropriate sections (particularly comment discipline and type of document for sorting) of the comment form and enter the comment in the space provided.

4.5. Click the Add Comment button. The comment will be added to the database and a fresh screen will appear for the next comment you have.

- 4.6. Once comments are all entered, exit DrChecks by choosing “My Account” and then Logout.

## **5.0 DrChecks Comment Evaluation**

The role of the designers of record is to evaluate and respond to the comments entered by the Government reviewers and by the DB Contractor. To respond to comments:

- 5.1. Log into DrChecks.
- 5.2. Click on the appropriate project.
- 5.3. Under “Evaluate” click on the number under “Pending”.
- 5.4. Locate the comments that require your evaluation. (Note: If you know the comment number you can use the Quick Pick window on your home page in DrChecks; enter the number and click on go.)
- 5.5. Select the appropriate evaluation (concur, non-concur, for information only, or check and resolve) and add the response.
- 5.6. Click on the Add button. The evaluation will be added to the database and a fresh screen will appear with the next comment.
- 5.7. Once evaluations are all entered, exit DrChecks by choosing “My Account” and then Logout.

## **6.0 DrChecks Back-check**

At the following design conference, participants will back-check comment annotations against newly presented documents to verify that the designers' responses are acceptable and completed. The Contractor and Government reviewers shall either enter additional back-check comments, as necessary or close those that are resolved as a result of the design conferences:

- 6.1. Log into DrChecks.
- 6.2. Click on the appropriate project.
- 6.3. Under “My Backcheck” click on the number under “Pending”.
- 6.4. If you agree with the designer's response select “Close Comment” and add a closing response if desired.
- 6.5. If you do not agree with the designer's response or the submittal does not reflect the response given, select “Issue Open”, enter additional information.
- 6.6. Click on the Add button. The back-check will be added to the database and a fresh screen will appear with the next comment.
- 6.7. Once back-checks are all entered, exit DrChecks by choosing “My Account” and then Logout. The design is completed and final when there are no pending comments to be evaluated and there are no pending or open comments under back-check.

**ATTACHMENT D**  
**SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW**

Instructions: Use the information outlined in this document to provide the minimum requirement for development of Fire Protection and Life Safety Code submittals for all building projects. Additional and supplemental information may be used to further develop the code review. Insert N/A after criteria, which may be "not applicable".

**1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW**

- 1.1. Project Name (insert name and location)
- 1.2. Applicable Codes and Standards
  - 1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities
  - 1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.
  - 1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.
  - 1.2.4. ADA and ABA Accessibility Guidelines. For Buildings and Facilities See Section 01 10 00, Paragraph 3 for facility specific criteria.
- 1.3. Occupancy Classification  
IBC chapters 3 and 4
- 1.4. Construction Type  
IBC chapter 6
- 1.5. Area Limitations  
IBC chapter 5, table 503
- 1.6. Allowable Floor Areas  
IBC section 503, 505
- 1.7. Allowable area increases  
IBC section 506, 507
- 1.8. Maximum Height of Buildings  
IBC section 504
- 1.9. Fire-resistive substitution
- 1.10. Occupancy Separations  
IBC table 302.3.2
- 1.11. Fire Resistive Requirements
  - 1.11.1. Exterior Walls - [ ] hour rating, IBC table 601, 602
  - 1.11.2. Interior Bearing walls - [ ] hour rating
  - 1.11.3. Structural frame - [ ] hour rating
  - 1.11.4. Permanent partitions - [ ] hour rating

- 1.11.5. Shaft enclosures - [ ] hour rating
- 1.11.6. Floors & Floor-Ceilings - [ ] hour rating
- 1.11.7. Roofs and Roof Ceilings - [ ] hour rating
- 1.12. Automatic Sprinklers and others used to determine the need for automatic Extinguishing Equipment, Extinguishing Systems, Foam Systems, Standpipe
  - 1.12.1. UFC 3-600-01, chapters 4 and 6 systems, wet chemical systems, etc. State which systems are required and to what criteria they will be designed.
  - 1.12.2. UFC 3-600-01, Appendix B Occupancy Classification. Note the classification for each room. This may be accomplished by classifying the entire building and noting exceptions for rooms that differ (E.g. The entire building is Light Hazard except boiler room and storage rooms which are [ ], etc.)
  - 1.12.3. UFC 3-600-01, Chapter 3 Sprinkler Design Density, Sprinkler Design Area, Water Demand for Hose Streams (supply pressure and source requirements).
  - 1.12.4. UFC 3-600-01, Chapter 4 Coverage per sprinkler head. Extended coverage sprinkler heads are not permitted.
  - 1.12.5. Available Water Supply. Provide the results of the water flow tests showing the available water supply static pressure and residual pressure at flow. Based on this data and the estimated flow and pressure required for the sprinkler system, determine the need for a fire pump.
  - 1.12.6. NFPA 13, Para. 8.16.4.6.1. Provide backflow preventer valves as required by the local municipality, authority, or water purveyor. Provide a test valve located downstream of the backflow preventer for flow testing the backflow preventer at full system demand flow. Route the discharge to an appropriate location outside the building.
- 1.13. Kitchen Cooking Exhaust Equipment

Describe when kitchen cooking exhaust equipment is provided for the project. Type of extinguishing systems for the equipment should be provided. per NFPA 96. Show all interlocks with manual release switches, fuel shutoff valves, electrical shunt trips, exhaust fans, and building alarms.
- 1.14. Portable Fire Extinguishers, fire classification and travel distance. per NFPA 10
- 1.15. Enclosure Protection and Penetration Requirements. - Opening Protectives and Through Penetrations
  - 1.15.1. IBC Section 712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [ ] hour rating. IBC Table 302.1.1
  - 1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives
- 1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A). State whether isolation smoke dampers are required at the air handler.
- 1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72
- 1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).
- 1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4
- 1.20. Means of Egress

- 1.20.1. Separation of Means of Egress, NFPA 101 chapters 7 and 12-42; NFPA101.7.1.3
- 1.20.2. Occupant Load, NFPA101.7.3.1 and chapters 12-42.
- 1.20.3. Egress Capacity (stairs, corridors, ramps and doors) NFPA101.7.3.3
- 1.20.4. Number of Means of Egress, NFPA101.7.4 and chapters 12-42.
- 1.20.5. Dead end limits and Common Path of Travel, NFPA 101.7.5.1.6 and chapters 12-42.
- 1.20.6. Accessible Means of Egress (for accessible buildings), NFPA101.7.5.4
- 1.20.7. Measurement of Travel Distance to Exits, NFPA101.7.6 and chapters 12-42.
- 1.20.8. Discharge from Exits, NFPA101.7.7.2
- 1.20.9. Illumination of Means of Egress, NFPA101.7.8
- 1.20.10. Emergency Lighting, NFPA101.7.9
- 1.20.11. Marking of Means of Egress, NFPA101.7.10
- 1.21. Elevators, UFC 3-600-01, Chapter 6; IBC and ASME A17.1 - 2000,(Safety Code for Elevators and Escalators)
- 1.22. Accessibility Requirements, ADA and ABA Accessibility Guidelines for Buildings and Facilities
- 1.23. Certification of Fire Protection and Life Safety Code Requirements. (Note: Edit the Fire team membership if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features for this project in accordance with the attached completed form(s).
- 1.24. Designer of Record. Certification of Fire protection and Life Safety Code Requirements. (Note: Edit the Fire team members if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features of this project.

Fire Protection Engineer of Record:

---

Signature and Stamp

Date

OR

Architect of Record:

---

Signature and Stamp

Date

Mechanical Engineer of Record:

---

Signature and Stamp

Date

Electrical Engineer of Record:

Friday, April 29, 2011

---

Signature/Date

**ATTACHMENT E**  
**LEED SUBMITTALS**

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only	REQUIRED DOCUMENTATION	Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR	FEATURE	DUE AT			DATE	REV
<b>GENERAL</b>						
	GENERAL - All calculations shall be in accordance with LEED 2.2 Reference Guide.					
	GENERAL: Obtain excel version of this spreadsheet at <a href="http://en.sas.usace.army.mil/enWeb/EngineeringCriteria">http://en.sas.usace.army.mil/enWeb/EngineeringCriteria</a> . OCT09REV					
	GENERAL - For all credits, narrative/comments may be added to describe special circumstances or considerations regarding the project's credit approach.					
	GENERAL - Include all required LEED drawings indicated below in contract drawings with applicable discipline drawings, labeled For Reference Only.					
	NOTE: Each submittal indicated with "****" differs from LEED certified project submittals by either having a different due date or being an added submittal not required by GBCI. OCT09REV					
	OCT09REV GENERAL - Audit documentation may include but is not limited to what is indicated in this table.					
			Closeout	List of all Final Design submittals revised after final design to reflect actual closeout conditions. Revised Final Design submittals. - OR - Statement confirming that no changes have been made since final design that effect final design submittal documents.		Proj Engr (PE)
<b>CATEGORY 1 - SUSTAINABLE SITES</b>						
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	**Final Design		List of drawings and specifications that address the erosion control, particulate/dust control and sedimentation control measures to be implemented.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		**Final Design		Narrative that indicates which compliance path was used (NPDES or Local standards) and describes the measures to be implemented on the project. If a local standard was followed, provide specific information to demonstrate that the local standard is equal to or more stringent than the NPDES program.		CIV
SS1	Site Selection	Final Design		Statement confirming that project does not meet any of the prohibited criteria.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		Final Design	X	LEED Site plan drawing that shows all proposed development, line depicting boundary of all bodies of water and/or wetlands within 100 feet of project boundary and a line depicting 5' elevation above 100 year flood line that falls within project boundary. Not required if neither condition applies.		CIV
SS2	Development Density & Community Connectivity	Final Design		Option 1: LEED Site vicinity plan showing project site and surrounding development. Show density boundary or note drawing scale.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		Final Design		Option 1: Table indicating, for project site and all surrounding sites within density radius (keyed to site vicinity plan), site area and building area. Project development density calculation. Density radius calculation. Development density calculation within density radius.		CIV
		Final Design		Option 2: LEED Site vicinity plan showing project site, the 1/2 mile community radius, pedestrian walkways and the locations of the residential development(s) and Basic Services surrounding the project site.		CIV
		Final Design		Option 2: List (including business name and type) of all Basic Services facilities within the 1/2 mile radius, keyed to site vicinity plan.		CIV
SS3	Brownfield Redevelopment	Final Design		Narrative describing contamination and the remediation activities included in project. Include statement indicating how site was determined to be a brownfield.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS4.1	Alternative Transportation: Public Transportation Access	Final Design		Statement indicating which option for compliance applies. State whether public transportation is existing or proposed and, if proposed, cite source of this information.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		Final Design		Option 1: LEED Site vicinity plan showing project site, mass transit stops and pedestrian path to them with path distance noted.		CIV
		Final Design		Option 2: LEED Site vicinity plan showing project site, bus stops and pedestrian path to them with path distance noted.		CIV
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Final Design		FTE calculation. Bicycle storage spaces calculation. Shower/changing facilities calculation.		CIV
		Final Design		List of drawings that show the location(s) of bicycle storage areas. Statement indicating distance from building entrance.		CIV
		Final Design		List of drawings that show the location(s) of shower/changing facilities and, if located outside the building, statement indicating distance from building entrance.		ARC
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	Final Design		Statement indicating which option for compliance applies. FTE calculation. Statement indicating total parking capacity of site.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		Final Design		Option 1: Low-emission & fuel-efficient vehicle calculation.		CIV

Friday, April 29, 2011



LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design	Option 1: List of drawings and specification references that show location and number of preferred parking spaces for low-emission & fuel-efficient vehicles and signage.		CIV
			Final Design	Option 1: Statement indicating quantity, make, model and manufacturer of low-emission & fuel-efficient vehicles to be provided. Statement confirming vehicles are zero-emission or indicating ACEEE vehicle scores.		CIV
			Final Design	Option 2: Low-emission & fuel-efficient vehicle parking calculation.		CIV
			Final Design	Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Low-emission & fuel-efficient vehicle refueling station calculation.		CIV
			Final Design	Option 3: List of drawings and specifications indicating location and number of refueling stations, fuel type and fueling capacity for each station for an 8-hour period.		CIV
			Closeout	Option 3: Construction product submittals indicating what was provided and confirming compliance with respect to fuel type and fueling capacity for each station for an 8-hour period.		CIV
SS4.4		Alternative Transportation: Parking Capacity	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Preferred parking calculation including number of spaces required, total provided, preferred spaces provided and percentage.		CIV
			Final Design	Option 2: FTE calculation. Preferred parking calculation including number of spaces provided, preferred spaces provided and percentage.		CIV
			Final Design	Options 1 and 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Narrative indicating number of spaces required and provided and describing infrastructure and support programs with description of project features to support them.		CIV
SS5.1		Site Development: Protect or Restore Habitat	**Final Design	Option 1: List of drawing and specification references that convey site disturbance limits.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Option 2: LEED site plan drawing that delineates boundaries of each preserved and restored habitat area with area (sf) noted for each.		CIV
			**Final Design	Option 2: Percentage calculation of restored/preserved habitat to total site area. List of drawings and specification references that convey restoration planting requirements.		CIV
SS5.2		Site Development: Maximize Open Space	Final Design	Option 2: LEED site plan drawing delineating boundary of vegetated open space adjacent to building with areas of building footprint and designated open space noted.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS6.1		Stormwater Design: Quantity Control	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf) -OR - Narrative describing site conditions, measures and controls to be implemented to prevent excessive stream velocities and erosion.		CIV
			Final Design	Option 2: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf). Indicate percent reduction in each.		CIV
SS6.2		Stormwater Design: Quality Control	Final Design	For non-structural controls, list all BMPs used and, for each, describe the function of the BMP and indicate the percent annual rainfall treated. List all structural controls and, for each, describe the pollutant removal and indicate the percent annual rainfall treated.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.1		Heat Island Effect: Non-Roof	**Final Design	LEED site plan drawing indicating locations and quantities of each paving type, including areas of shaded pavement. Percentage calculation indicating percentage of reflective/shaded/open grid area.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.2		Heat Island Effect: Roof	Final Design	Option 1: Percentage calculation indicating percentage of SRI compliant roof area. List of drawings and specification references that convey SRI requirements and roof slopes.		ARC

Friday, April 29, 2011

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design OCT09REV	Option 1: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		ARC
			**Closeout OCT09REV	Option 1: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 1: Manufacturer published product data or certification confirming SRI		PE
			Final Design	Option 2: Percentage calculation indicating percentage of vegetated roof area.		ARC
			Final Design	Option 3: Combined reflective and green roof calculation.		ARC
			Final Design OCT09REV	Option 3: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		
			**Closeout OCT09REV	Option 3: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 3: Manufacturer published product data or certification confirming SRI		PE
SS8		Light Pollution Reduction	Final Design	Interior Lighting: List of drawings and specification references that convey interior lighting requirements (location and type of all installed interior lighting, location of non-opaque exterior envelope surfaces, allowing confirmation that maximum candela value from interior fixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls that turn off non-essential lighting during non-business hours		ELEC
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		ELEC
			Final Design	Exterior Lighting: List of drawings and specification references that convey exterior lighting requirements (location and type of all site lighting and building facade/landscape lighting).		ELEC
			Final Design	Exterior Site Lighting Power Density (LPD): Tabulation for exterior site lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all site lighting.		ELEC
			Final Design	Exterior Building Facade/Landscape Lighting Power Density (LPD): Tabulation for exterior building facade/landscape lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all building facade/landscape lighting.		ELEC
			Final Design	Exterior Lighting IESNA Zone: Indicate which IESNA zone is applicable to the project.		ELEC
			Final Design	Exterior Lighting Site Lumen table indicating, for each fixture type, quantity installed, initial lamp lumens per luminaire, initial lamp lumens above 90 degrees from Nadir, total lamp lumens and total lamp lumens above 90 degrees. Percentage of site lamp lumens above 90 degrees from nadir to total lamp lumens.		ELEC
			Final Design	Exterior Lighting Narrative describing analysis used for addressing requirements for light trespass at site boundary and beyond.		ELEC
<b>CATEGORY 2 – WATER EFFICIENCY</b>						
WE1.1		Water Efficient Landscaping: Reduce by 50%	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Calculation indicating, for baseline and design case, total water applied, total potable water applied, total non-potable water applied. Design case percent potable water reduction. If nonpotable water is used, indicate source of nonpotable water.		CIV
			Final Design	List of landscape plan drawings.		CIV
			Final Design	Narrative describing landscaping and irrigation design strategies, including water use calculation methodology used to determine savings and, if non-potable water is used, specific information about source and available quantity.		CIV
WE1.2		Water Efficient Landscaping: No Potable Water Use or No Irrigation	Same as WE1.1	Same as WE1.1		CIV
WE2		Innovative Wastewater Technologies	Final Design	Statement confirming which option for compliance applies.		MEC

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Final Design	Option 1: If onsite non-potable water is used, identify source(s), indicate annual quantity from each source and indicate total annual quantity from all onsite non-potable water sources.		MEC
			Final Design	Option 1: Summary calculation indicating baseline annual water consumption, design case annual water consumption, non-potable annual water consumption and total percentage annual water savings.		MEC
			Final Design	Option 2: Statement confirming on-site treatment of all generated wastewater to tertiary standards and all treated wastewater is either infiltrated or used on-site.		MEC
			Final Design	Option 2: List of drawing and specification references that convey design of on-site wastewater treatment features.		CIV
			Final Design	Option 2: On-site water treatment quantity calculation indicating all on-site wastewater source(s), annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from each source and totals for annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from all sources.		CIV
			Final Design	Option 2: Wastewater summary calculation indicating design case annual flush fixture water usage, annual on-site water treatment and percentage sewage conveyance reduction.		MEC
			Final Design	Narrative describing project strategy for reduction of potable water use for sewage conveyance, including specific information on reclaimed water usage and treated wastewater usage.		MEC
WE3.1		Water Use Reduction: 20% Reduction	Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Closeout	X Manufacturer published product data or certification confirming fixture water usage.		PE
WE3.2		Water Use Reduction: 30% Reduction	Same as WE3.1	Same as WE3.1		MEC
<b>CATEGORY 3 – ENERGY AND ATMOSPHERE</b>						
EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design	**Owner's Project Requirements document		ALL
			**Final Design	**Basis of Design document for commissioned systems		MEC, ELEC
			**Final Design	**Commissioning Plan		MEC, ELEC

Friday, April 29, 2011

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	Commissioning Report		PE
EAPR2		Minimum Energy Performance (PREREQUISITE)	Final Design	Statement listing the mandatory provisions of ASHRAE 90.1 that project meets relative to compliance with this prerequisite and indicating which compliance path was used.		MEC ELEC ARC
EAPR3		Fundamental Refrigerant Management (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies.		MEC
			Final Design	Option 2: Narrative describing phase out plan, including specific information on phase out dates and refrigerant quantities.		MEC
EA1		Optimize Energy Performance	Final Design	Statement indicating which compliance path option applies.		MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EA2.1		On-Site Renewable Energy	Final Design	Statement indicating which compliance path option applies.		ELEC
			Final Design	List all on-site renewable energy sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost. Indicate total annual energy use (all sources), total annual energy cost (all sources) and percent renewable energy cost.		ELEC MEC
			Final Design	Option 1: Indicate, for renewable energy, proposed design total annual energy generated and annual cost.		ELEC MEC
			Final Design	Option 2: Indicate CBECS building type and building gross area. Provide the following CBECS data: median annual electrical intensity, median annual non-electrical fuel intensity, average electric energy cost, average non-electric fuel cost, annual electric energy use and cost, annual non-electric fuel use and cost.		ELEC MEC
			Final Design	Option 2: Narrative describing renewable systems and explaining calculation method used to estimate annual energy generated, including factors influencing performance.		ELEC MEC
EA2.2		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA2.3		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA3		Enhanced Commissioning	**Final Design	**Owner's Project Requirements document (OPR)		ALL
			**Final Design	**Basis of Design document for commissioned systems (BOD)		ELEC MEC
			**Final Design	**Commissioning Plan		ELEC MEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	**Commissioning Report		PE
			**Final Design	Statement by CxA confirming Commissioning Design Review		
			Closeout	Statement by CxA confirming review of Contractor submittals for compliance with OPR and BOD		PE
			Closeout	**Systems Manual		PE
			Closeout	Statement by CxA confirming completion of O&M staff and occupant training		PE
			Closeout	**Scope of work for post-occupancy review of building operation, including plan for resolution of outstanding issues		PE
			**Predesign	Statement confirming CxA qualifications and contractual relationships relative to work on this project, demonstrating that CxA is an independent third party.		MEC
EA4		Enhanced Refrigerant Management	Final Design	Refrigerant impact calculation table with all building data and calculation values as shown in LEED 2.2 Reference Guide Example Calculations		MEC
			Final Design	Narrative describing any special circumstances or explanatory remarks OCT09REV		
			Closeout	X Cut sheets highlighting refrigerant data for all HVAC components.		PE
EA5		Measurement & Verification	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Measurement and Verification Plan		PE
			Closeout	**Scope of work for post-occupancy implementation of M&V plan		PE
EA6		Green Power	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Option 1: Indicate proposed design total annual electric energy usage		PE
			Closeout	Option 2: Indicate actual total annual electric energy usage		PE
			Closeout	Option 3: Calculation indicating building type, total gross area, median electrical intensity and annual electric energy use		PE

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Closeout	Green power provider summary table indicating, for each purchase type, provider name, annual quantity green power purchased and contract term. Indicate total annual green power use and indicate percent green power		PE
			Closeout	Narrative describing how Green Power or Green Tags are purchased		PE
<b>CATEGORY 4 – MATERIALS AND RESOURCES</b>						
MRPR1		Storage & Collection of Recyclables (PREREQUISITE)	Final Design	Statement confirming that recycling area will accommodate recycling of plastic, metal, paper, cardboard and glass. Narrative indicating any other materials addressed and coordination with pickup.		ARC
MR1.1		Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building structural/envelope element, the existing area and reused area. Total percent reused.		ARC
MR1.2		Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	Same as MR1.1	Same as MR1.1		ARC
MR1.3		Building Reuse: Maintain 50% of Interior Non-Structural Elements	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building interior non-structural element, the existing area and reused area. Total percent reused.		ARC
MR2.1		Construction Waste Management: Divert 50% From Disposal	**Preconstruction	Waste Management Plan		PE
			**Construction Quarterly and Closeout	Spreadsheet calculations indicating material description, disposal/diversion location (or recycling hauler), weight, total waste generated, total waste diverted, diversion percentage		PE
			**Construction Quarterly and Closeout	OCT09REV		
			**Construction Quarterly and Closeout	Receipts/tickets for all items on spreadsheet		PE
MR2.2		Construction Waste Management: Divert 75% From Disposal	Same as MR2.1	Same as MR2.1		PE
MR3.1		Materials Reuse: 5%	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each reused/salvaged material, material description, source or vendor, cost. Total reused/salvaged materials percentage.		PE
MR3.2		Materials Reuse: 10%	Same as MR3.1	Same as MR3.1		PE
MR4.1		Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each recycled content material, material name/description, manufacturer, cost, post-consumer recycled content percent, pre-consumer recycled content percent, source of recycled content data. Total post-consumer content materials cost, total pre-consumer content materials cost, total combined recycled content materials cost, recycled content materials percentage.		PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	X Manufacturer published product data or certification, confirming recycled content percentages in spreadsheet		PE
MR4.2		Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Same as MR4.1	Same as MR4.1		PE
MR5.1		Regional Materials: 10% Extracted, Processed & Manufactured Regionally	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each regional material, material name/description, manufacturer, cost, percent compliant, harvest distance, manufacture distance, source of manufacture and harvest location data. Total regional materials cost, regional materials percentage.		PE
			Preconstruction OCT09REV	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	X Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

Friday, April 29, 2011

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
MR5.2		Regional Materials:20% Extracted, Processed & Manufactured Regionally	Same as MR5.1	Same as MR5.1		PE
MR6		Rapidly Renewable Materials	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each rapidly renewable material, material name/description, manufacturer, cost, rapidly renewable content percent, rapidly renewable product value. Total rapidly renewable product value, rapidly renewable materials percentage.		PE
			Final Design OCT09REV	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		ARC
			Closeout	Manufacturer published product data or certification confirming rapidly renewable material percentages in spreadsheet		PE
MR7		Certified Wood	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each certified wood material, material name/description, vendor, cost, wood component percent, certified wood percent of wood component, FSC chain of custody certificate number. Total certified wood product value, certified wood materials percentage.		PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	Vendor invoices, FSC chain of custody certificates and manufacturer published product data or certification confirming all certified wood materials percentages in spreadsheet.		PE
<b>CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY</b>						
EQPR1		Minimum IAQ Performance (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about fresh air intake volumes and special considerations.		MEC
EQPR2		Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.		ARC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements (signage, exhaust system, room separation details, etc).		ARC
EQ1		Outdoor Air Delivery Monitoring	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.		MEC
			Final Design	Narrative describing the project's ventilation design and CO2 monitoring system, including specifics about monitors, operational parameters and setpoints.		MEC
			Closeout	X Cut sheets for CO2 monitoring system.		PE
EQ2		Increased Ventilation	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about zone fresh air intake volumes and demonstrating compliance.		MEC
			Final Design	Option 2: Narrative describing design method used for determining natural ventilation design, including calculation methodology/model results and demonstrating compliance.		MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.		MEC
EQ3.1		Construction IAQ Management Plan: During Construction	**Preconstruction	Construction IAQ Management Plan		PE
			Closeout	Statement confirming whether air handling units were operated during construction		PE
			Closeout	Dated jobsite photos showing examples of IAQ management plan practices being implemented. Label photos to indicate which practice they demonstrate. Minimum one photo of each practice at each building.		PE
			Closeout	Spreadsheet indicating, for each filter installed during construction, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy.		PE
EQ3.2		Construction IAQ Management Plan: Before Occupancy	**Preconstruction	Construction IAQ Management Plan		PE

Friday, April 29, 2011

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Closeout	Statement indicating which option for compliance applies and confirming that required activities have occurred that meet the applicable requirements.		PE
			Closeout	Option 1a: Narrative describing the project's flushout process, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 1b: Narrative describing the project's pre-occupancy and post-occupancy flushout processes, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 2: Narrative describing the project's IAQ testing process, including specifics about contaminants tested for, locations, remaining work at time of test, retest parameters and special considerations (if any).		PE
			Closeout	Option 2: IAQ testing report demonstrating compliance.		PE
EQ4.1		Low Emitting Materials: Adhesives & Sealants	Closeout	Spreadsheet indicating, for each applicable indoor adhesive, sealant and sealant primer used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor aerosol adhesive, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor aerosol adhesives were used for the project.		PE
			Closeout	X Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.2		Low Emitting Materials: Paints & Coatings	Closeout	Spreadsheet indicating, for each applicable indoor paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor anti-corrosive/anti-rust paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor anti-corrosive/anti-rust paints were used for the project .		PE
			Closeout	X Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.3		Low Emitting Materials: Carpet Systems	Closeout	Spreadsheet indicating, for each indoor carpet used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data.		PE
			Closeout	Spreadsheet indicating, for each indoor carpet cushion used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data - OR - Statement confirming no indoor carpet cushion was used for the project.		PE
			Closeout	X Manufacturer published product data or certification confirming material CRI label in spreadsheet		PE
EQ4.4		Low Emitting Materials: Composite Wood & Agrifiber Products	Closeout	Spreadsheet indicating, for each indoor composite wood and agrifiber product used, the manufacturer, product name/model number, if it contains added urea formaldehyde (yes/no) and source of LEED compliance data.		PE
			Closeout	X Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet		PE
EQ5		Indoor Chemical & Pollutant Source Control	Closeout OCT09REV	Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system. Roll-up and carpet systems requiring weekly cleaning to earn this credit are not a permitted option for Army projects.		PE
			Final Design	List of drawing and specification references that convey locations and installation methods for entryway systems.		ARC
			Final Design	Spreadsheet indicating, for each chemical use area, the room number, room name, description of room separation features (walls, floor/ceilings, openings) and pressure differential from surrounding spaces with doors closed - OR - Statement confirming that project includes no chemical use areas and that no hazardous cleaning materials are needed for building maintenance.		ARC MEC
			Final Design	If project includes chemical use areas: List of drawing and specification references that convey locations of chemical use areas, room separation features and exhaust system.		ARC MEC
			Closeout OCT09REV	If project includes chemical use areas: Spreadsheet indicating, for AHUs/mechanical ventilation equipment serving occupied areas, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy (yes/no) - OR - Statement confirming that project does not use mechanical equipment for ventilation of occupied areas.		PE

Friday, April 29, 2011



LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
EQ6.1		Controllability of Systems: Lighting	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual lighting controls and the percentage of workstations with individual lighting controls.		ELEC
			Final Design	For each shared multi-occupant space, provide a brief description of lighting controls.		ELEC
			Final Design	Narrative describing lighting control strategy, including type and location of individual controls and type and location of controls in shared multi-occupant spaces.		ELEC
EQ6.2		Controllability of Systems: Thermal Comfort	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual thermal comfort controls and the percentage of workstations with individual thermal comfort controls.		MEC
			Final Design	For each shared multi-occupant space, provide a brief description of thermal comfort controls.		MEC
			Final Design	Narrative describing thermal comfort control strategy, including type and location of individual and shared multi-occupant controls.		MEC
EQ7.1		Thermal Comfort: Design	Final Design	Design criteria spreadsheet indicating, for spring, summer, fall and winter, maximum indoor space design temperature, minimum indoor space design temperature and maximum indoor space design humidity.		MEC
			Final Design	Narrative describing method used to establish thermal comfort control conditions and how systems design addresses the design criteria, including compliance with the referenced standard.		MEC
EQ7.2		Thermal Comfort: Verification	Final Design	Narrative describing the scope of work for the thermal comfort survey, including corrective action plan development		MEC
EQ8.1		Daylight & Views: Daylight 75% of Spaces	Final Design	Option 1: Table indicating all regularly occupied spaces with space area and space area with 2% daylighting factor. Sum of regularly occupied areas and regularly occupied areas with 2% daylighting factor. Percentage calculation of areas with 2% daylighting factor to total regularly occupied areas.		ARC
			Final Design	Option 1: Glazing factor calculation table		ARC
			Final Design	Option 2: Simulation model method, software and output data		ARC
			Final Design	Option 2: Table indicating all regularly occupied spaces with space area, space area with minimum 25 footcandles daylighting illumination, and method of providing glare control. Sum of regularly occupied areas and regularly occupied areas with 25 fc daylighting. Percentage calculation of areas with 25 fc daylighting to total regularly occupied areas.		ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design	List of drawing and specification references that convey exterior glazed opening head and sill heights and glazing performance properties.		ARC
			Closeout	Manufacturer published product data or certification confirming glazing Tvis in spreadsheet		PE
EQ8.2		Daylight & Views: Views for 90% of Spaces	Final Design	Table indicating all regularly occupied spaces with space area and space area with access to views. Sum of regularly occupied areas and regularly occupied areas with access to views. Percentage calculation of areas with views to total regularly occupied areas.		ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design	LEED Floor plan drawings showing line of sight diagramming of views areas in each regularly occupied space. List of drawing/specification references that convey exterior glazed opening head and sill heights.		ARC
<b>CATEGORY 6 – FACILITY DELIVERY PROCESS</b>						
IDc1.1		Innovation in Design	Final Design OCT09REV	Narrative describing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit.		
IDc1.2		Innovation in Design	Final Design OCT09REV			
IDc1.3		Innovation in Design	Final Design OCT09REV			
IDc1.4		Innovation in Design	Final Design OCT09REV			
IDc2		LEED Accredited Professional	Final Design	Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsibilities in the project.		ARC

**ATTACHMENT F**  
Version 07-07-2010

**BUILDING INFORMATION MODELING REQUIREMENTS**

**1.0 Section 1 - Submittal Format**

1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be Full size, suitable for half-size scaled reproduction.

**2.0 Section 2 – Design Requirements**

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. "Facility Data" is defined as associated intelligent attribute data. The "Model" is defined as 3D graphics that includes Facility Data and output as described in the paragraph 'Output' below. Contractors will use the Model to produce accurate Construction Documents. For each Center of Standardization (CoS) facility type included in this project, all BIM Models and associated Facility Data shall be submitted in Bentley Systems BIM V8i with associated USACE Bentley BIM Workspace (which includes specific standard BIM libraries and definitions). This Workspace can be downloaded from the CAD/BIM Technology Center. [Where available, the workspace will be specific to this CoS Facility Standard Design. The Contractor will be provided a baseline multi-discipline BIM Project Model for the CoS Facility Standard Design type, where such a model exists (for the purposes of site adaptation).] The USACE Bentley BIM Workspace is dependent on specific versions of the Bentley BIM suite of products and only the versions of the software that are listed in the Contractor instructions included with the USACE BIM Workspace are permitted to be used.

2.1.1. Reference. Refer to ERDC TR-06-10, "U.S. Army Corps of Engineers Building Information Modeling Road Map" from the CAD/BIM Technology Center website for more information on the USACE BIM implementation goals.

2.2. Drawings. Deliver CAD files used for the creation of the Construction Documents Drawings per requirements in Section 01 33 16, the criteria of the USACE US Army Engineer District, Fort Worth District, and as noted herein. Specification of a CAD file format for these Drawings does not limit which BIM application(s) or software(s) may be used for project development and execution.

2.2.1. IFC Support. The Contractor's selected BIM application(s) and software(s) must support the IFC (Industry Foundation Class - see [www.iai-tech.org](http://www.iai-tech.org)). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

2.2.2. Submittal Requirements. BIM submittals shall be fully interoperable, compatible, and editable with the Bentley BIM tools. Use the specified version of the USACE Bentley BIM Workspace and conform to the requirements of **Sections 3 and 4 below**.

2.2.3. BIM Project Execution Plan.

2.2.3.1. Develop a BIM Project Execution Plan ("Plan" or "PxP") documenting the BIM and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be executed. See Section 7 for additional guidance on developing the Plan.

2.2.4. BIM Requirements..

2.2.4.1. Facility Data. Develop the Facility Data consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions and attributes that are necessary for the Project facility design and construction. Additional data in support of Section 6 Contractor Electives is encouraged.

2.2.4.2. Model Content. The Model and Facility Data shall include, at a minimum, the requirements of Section 4 below.

2.2.4.3. Model Granularity. Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16<sup>th</sup>, 1/8<sup>th</sup> and 1/4<sup>th</sup>), or appropriately scaled civil drawings.

2.2.4.4. Output. Submitted CAD drawings (e.g., plans, elevations, sections, schedules, details, etc.) shall be derived (commonly known as extractions, views or sheets) and maintained from the submitted Model and Facility Data.

2.3. Quality Control. Implement quality control (QC) parameters for the Model, including:

2.3.1. Model Standards Checks. QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Report non-compliant elements and corrective action plan to correct non-compliant elements. Provide the government with detailed justification and request government approval for any non-compliant element which the contractor proposes to be allowed to remain in the Model.

2.3.2. CAD Standards Checks. QC checking performed to ensure that the fonts, dimensions, line styles, levels and other construction document formatting issues are followed per the A/E/C CADD Standard.

2.3.3. Other Parameters. Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.

2.4. Design and Construction Reviews. Perform design and construction reviews at each submittal stage under Section 3 to test the Model, including:

2.4.1. Visual Checks. Checking to ensure the design intent has been followed and that there are no unintended elements in the Model.

2.4.2. Interference Management Checks. Locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences, (e.g., conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

2.4.3. IFC Coordination View. Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.

2.4.4. Other Parameters. Develop such other Review parameters as the Contractor deems appropriate for the Project and provide to the Government for concurrence..

### **3.0 Section 3 – Design Stage Submittal Requirements**

3.1. General Submittal Requirements.

3.1.1. Provide submittals in compliance with BIM Project Execution Plan deliverables at stages as described hereinafter.

3.1.2. At each Stage in Paragraphs 3.3 through 3.6, provide a Contractor-certified written report confirming that consistency checks as identified in Paragraphs 2.3 and 2.4 have been completed. This report shall be discussed as part of the review process and shall address cross-discipline interferences, if any.

3.1.3. At each Stage in Paragraphs 3.3 through 3.6, provide the Government with:

- The Model, Facility Data, Workspace and CAD Data files in native Bentley BIM/CAD.

- A 3-D interactive review format of the Model in Bentley Navigator, Autodesk Navisworks, Adobe 3D PDF 7.0 (or later), Google Earth KMZ or other format per Plan requirements. The file format for reviews can change between submittals.

- A list of all submitted files. The list should include a description, directory, and file name for each file submitted. For all CAD sheets, include the sheet title and sheet number. Identify files that have been produced from the submitted Model and Facility Data.

3.1.4. The Government will confirm acceptability of all submittals identified in Section 3 in coordination with the USACE US Army Engineer District, Fort Worth BIM Manager

3.2. Initial Design Conference Submittal.

3.2.1. Submit a digital copy of the Plan where, in addition to Paragraph 3.1.4, the USACE Geographic District BIM Manager will coordinate with the USACE CoS BIM Manager to confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated.

3.2.2. Within thirty (30) days after the approval of the Plan, conduct a demonstration to review the Plan for clarification, and to verify the functionality of Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the Plan and perform subsequent demonstration for Government acceptance. There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the approved Plan.

3.3. Interim Design Submittals.

3.3.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4 as applicable to the Interim Design package(s).

3.4. Final Design Submissions and Design Complete Submittals.

3.4.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4. Acceptance according to Paragraph 3.1.4 is required before commencement of construction, as described in Paragraph 3.7.6 of Section 01 33 16.

3.5. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model, including interference management and design change tracking information.

3.6. Final As-Built BIM and CAD Data Submittal. Submit the final Model, Facility Data, and CAD files reflecting as-built conditions for Government Approval, as specified in Section 01 78 02.00 10, PROJECT CLOSEOUT.

#### **4.0 Section 4 – BIM Model Minimum Requirements and Output**

4.1. General Provisions. The deliverable Model shall be developed to include the systems described below as they would be built and the processes of installing them, and to reflect final as-built conditions. The deliverable model at the interim design stage and at the final design stage (“released for construction”) shall be developed to include as many of the systems described below as are necessary and appropriate at that design stage.

4.2. Architectural/Interior Design. The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.2.1. Spaces. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room names and numbers. Include Programmatic Information provided by the Government or validated program to verify design space against programmed space, using this information to validate area quantities.

4.2.2. Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

- 4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.
- 4.2.4. Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.
- 4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.
- 4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.
- 4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.
- 4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.
- 4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.
- 4.2.10. Schedules. Provide door, window, hardware sets using BHMA designations, flooring, wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.
- 4.3. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing, and have necessary intelligence to produce accurate plans. Representation of furniture elements is to be 2D. Contractor may provide a minimal number of 3D representations as examples. Examples of furniture include, but are not limited to, desks, furniture systems, seating, tables, and office storage.
- 4.3.1. Furniture Coordination. Furniture that makes use of electrical, data or other features shall include the necessary intelligence to produce coordinated documents and data.
- 4.4. Equipment. The Model may vary in level of detail for individual elements within a Model. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and minimum schedules depicting their configuration. Examples of equipment include but are not limited to copiers, printers, refrigerators, ice machines and microwaves.
- 4.4.1. Schedules. Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.
- 4.5. Structural. The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:
- 4.5.1. Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations
- 4.5.2. Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

4.5.3. Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

4.5.4. Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

4.5.5. Expansion/Contraction Joints. Joints shall be accurately depicted.

4.5.6. Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

4.5.7. Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

4.6. Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2" NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:

4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.

4.6.1.1. Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.

4.6.2. Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.

4.6.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.6.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.7. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2"Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:

4.7.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.

4.7.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

4.7.3. Grounding Systems. Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.7.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.

4.7.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

4.7.6. Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access

4.8. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.8.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

4.8.2. Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

4.9. Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

4.9.1. Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.

4.9.2. Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.3. Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.4. Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.

4.9.5. Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

## **5.0 Section 5 - Ownership and Rights in Data**

5.1. Ownership. The Government has ownership of and rights at the date of Closeout Submittal to all CAD files, BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27, clauses incorporated in Section 00 72 00, Contract Clauses and Special Contract Requirement 1.14 GOVERNMENT RE-USE OF DESIGN (Section 00 73 00). The Government may make use of this data following any deliverable.

## **6.0 Section 6 – Contractor Electives**

6.1. Applicable Criteria. If the Contractor elected to include one or more of the following features as an elective in its accepted contract proposal for additional credit during the source selection, as described in the proposal submission requirements and evaluation criteria, the following criteria are requirements, as applicable to those elective feature(s).

6.2. COBIE Compliance. The Model and Facility Data for the Project shall fulfill Construction Operations Building Information Exchange (COBIE) requirements as defined by the Whole Building Design Guide organization, including all requirements for the indexing and submission of Portable Document Format (PDF) and other appropriate file formats that would otherwise be printed and submitted in compliance with Project operations and maintenance handover requirements.

6.3. Project Scheduling using the Model. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of the project construction schedule.

6.3.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model.

6.3.1.1. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

6.4. Cost Estimating. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

6.4.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

6.4.2. Project completion. At project completion, the Contractor shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified Uniformat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken down by their location (proximity in the structure) as well as the complexity of its installation.

6.4.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACT 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing.

## **7.0 Section 7 – BIM Project Execution Plan Template**

7.1. Contractors will utilize the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template to develop an acceptable Plan. The template can be downloaded from the CAD/BIM Technology Center website.







**ATTACHMENT G****DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table. The Contractor may suggest a slightly different structure, subject to the discretion of the government.

**Design Submittal Directory and Subdirectory File Arrangement.**

Directory	Sub-Directory	Sub-Directory or Files	Files
Submittal/Package Name	Narratives	PDF file or files with updated design narrative for each applicable design discipline	
	Drawings	PDF (subdirectory)	Single PDF file with all applicable drawing sheets - bookmarked by sheet number and name
		BIM (subdirectory) See Attachment F.	BIM project folder (with files) per the USACE Workspace. Include an Excel drawing index file with each drawing sheet listed by sheet #, name and corresponding dgn file name (Final Design & Design Complete only)
	Design Analysis & Calculations	Individual PDF files containing design analysis and calculations for each discipline applicable to the submittal	
		PDF file with Fire Protection and Life Safety Code Review checklist	
	LEED	PDF file with updated Leed Check List	
		PDF file or files with LEED Templates for each point with applicable documentation included in each file.	
		LEED SUBMITTALS	
	Energy Analysis	PDF with baseline energy consumption analysis	
		PDF with actual building energy consumption analysis	
	Specifications	Single PDF file with table of contents and all applicable specifications sections.	
		Submittal Register (Final Design & Design Complete submittal only)	
	Design Quality Control	PDF file or files with DQC checklist(s) and/or statements	
	Building Rendering(s)	PDF file of rendering for each building type included in contract (Final Design & Design Complete).	

**SECTION 01 45 01.10  
QUALITY CONTROL SYSTEM (QCS)**

**1.0 GENERAL**

- 1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS
- 1.2. QCS SOFTWARE
- 1.3. SYSTEM REQUIREMENTS
- 1.4. RELATED INFORMATION
- 1.5. CONTRACT DATABASE
- 1.6. DATABASE MAINTENANCE
- 1.7. IMPLEMENTATION
- 1.8. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM
- 1.9. MONTHLY COORDINATION MEETING
- 1.10. NOTIFICATION OF NONCOMPLIANCE

## 1.0 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. The Contractor module, user manuals, updates, and training information can be downloaded from the RMS web site. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data
- Request for Information
- Accident Reporting
- Safety Exposure Manhours

### 1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS

For ease and speed of communications, both Government and Contractor will exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

### 1.2. OTHER FACTORS

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01 32 01.00 10, PROJECT SCHEDULE, Section 01 33 00, SUBMITTAL PROCEDURES, and Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

### 1.3. QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

### 1.4. SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

#### (a) Hardware

- IBM-compatible PC with 1000 MHz Pentium or higher processor
- 256 MB RAM for workstation / 512+ MB RAM for server
- 1 GB hard drive disk space for sole use by the QCS system
- Compact disk (CD) Reader, 8x speed or higher
- SVGA or higher resolution monitor (1024 x 768, 256 colors)
- Mouse or other pointing device
- Windows compatible printer (Laser printer must have 4+ MB of RAM)
- Connection to the Internet, minimum 56K BPS

(b) Software

- MS Windows 2000 or higher
- MS Word 2000 or newer
- Latest version of : Netscape Navigator, Microsoft Internet Explorer, or other browser that supports HTML 4.0 or higher
- Electronic mail (E-mail), MAPI compatible
- Virus protection software that is regularly upgraded with all issued manufacturer's updates

1.5. RELATED INFORMATION

1.5.1. QCS USER GUIDE

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.5.2. CONTRACTOR QUALITY CONTROL (CQC) TRAINING

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.6. CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by using the government's SFTP repository built into QCS import/export function. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.7. DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government, e.g., daily reports, submittals, RFI's, schedule updates, payment requests, etc. shall be submitted using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, email or CD-ROM may be used instead (see Paragraph DATA SUBMISSION VIA CD-ROM). The QCS database typically shall include current data on the following items:

1.7.1. ADMINISTRATION

1.7.1.1. Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format.

1.7.1.2. Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format.

1.7.1.3. Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main)

office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

All Requests For Information (RFI) shall be exchanged using the Built-in RFI generator and tracker in QCS.

#### 1.7.1.4. Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

#### 1.7.1.5. Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

### 1.7.2. FINANCES

#### 1.7.2.1. Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the design and construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

#### 1.7.2.2. Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet prompt payment certification, and payment invoice in QCS. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment request, prompt payment certification, and payment invoice with supporting data by using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, E-mail or a CD-ROM may be used. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

#### 1.7.3. Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a QCS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

#### 1.7.3.1. Daily Contractor Quality Control (CQC) Reports

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government within 24 hours after the date covered by the report. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

#### 1.7.3.2. Deficiency Tracking

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

#### 1.7.3.3. QC Requirements

The Contractor shall develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

#### 1.7.3.4. Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

#### 1.7.3.5. Labor and Equipment Hours

The Contractor shall log labor and equipment exposure hours on a daily basis. This data will be rolled up into a monthly exposure report.

#### 1.7.3.6. Accident/Safety Tracking Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This supplemental entry is not to be considered as a substitute for completion of mandatory notification and reports, e.g., ENG Form 3394 and OSHA Form 300.

#### 1.7.3.7. Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

#### 1.7.3.8. Hazard Analysis

The Contractor shall use QCS to develop a hazard analysis for each feature of work included in its CQC Plan. The hazard analysis shall address any hazards, or potential hazards, that may be associated with the work

#### 1.7.4. Submittal Management

The Government will provide the submittal register form, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. The Contractor and Designer of Record (DOR) shall develop and maintain a complete list of all submittals, including completion of all data columns and shall manage all submittals. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. QCS and RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

#### 1.7.5. Schedule

The Contractor shall develop a design and construction schedule consisting of pay activities, in accordance with Section 01 32 01.00 10, PROJECT SCHEDULE, as applicable. This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 01.00 10 PROJECT SCHEDULE). The updated schedule data shall be included with each pay request submitted by the Contractor.



#### 1.7.5.1. Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data from RMS, and schedule data using SDEF.

#### 1.8. IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

#### 1.9. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of QCS data is by using the government's SFTP repository built into QCS export function.. Other data should be submitted using E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of CD-ROM for data transfer. Data on CDs shall be exported using the QCS built-in export function. If used, CD-ROMs will be submitted in accordance with the following:

##### 1.9.1. File Medium

The Contractor shall submit required data on CD-ROMs. They shall conform to industry standards used in the United States. All data shall be provided in English.

##### 1.9.2. Disk Or Cd-Rom Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

##### 1.9.3. File Names

The files will be automatically named by the QCS software. The naming convention established by the QCS software shall not be altered in any way by the Contractor.

#### 1.10. MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions.

The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

#### 1.11. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

End of Section 01 45 01.10

**SECTION 01 45 04.00 10**  
**CONTRACTOR QUALITY CONTROL**

**1.0 GENERAL**

1.1. REFERENCES

1.2. PAYMENT

**2.0 PRODUCTS (NOT APPLICABLE)**

**3.0 EXECUTION**

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

## **1.0 GENERAL**

### **1.1. REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Refer to the latest edition, as of the date of the contract solicitation.

- ASTM INTERNATIONAL (ASTM)
- ASTM D 3740 Minimum Requirements for Agencies  
Engaged in the Testing and/or Inspection  
of Soil and Rock as Used in Engineering  
Design and Construction
- ASTM E 329 Agencies Engaged in the Testing  
and/or Inspection of Materials Used in  
Construction
- U.S. ARMY CORPS OF ENGINEERS (USACE)  
ER 1110-1-12 Quality Management

### **1.2. PAYMENT**

There will be no separate payment for providing and maintaining an effective Quality Control program. Include all costs associated therewith in the applicable unit prices or lump-sum prices contained in the Contract Line Item Schedule.

## **2.0 PRODUCTS (Not Applicable)**

## **3.0 EXECUTION**

### **3.1. GENERAL REQUIREMENTS**

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager at the site, responsible for the overall site activities, including but not limited to quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site. Different contractors have different names for the on-site overall project supervisor. For clarification, the term "site project superintendent" refers to the Contractor's senior site representative or "on-site manager", or other similar title, as those terms are used in contract Clause 52.236-7, "Superintendence by the Contractor" and in the Division 00 Section(s) of the solicitation for this contract or task order, or elsewhere in the contract. It does not refer to a construction superintendent, unless that person is also the Contractor's permanently assigned senior site representative in charge of all on-site activities.

### **3.2. QUALITY CONTROL PLAN**

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of

work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

### 3.2.1. Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

3.2.1.1. A description of the quality control organization. Include a chart showing lines of authority and an acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. A CQC System Manager shall report to the project superintendent or someone higher in the contractor's organization.

3.2.1.2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Also include those responsible for performing and documenting the inspections required by the International Codes and the special inspection program developed by the designer of record.

3.2.1.3. A copy of the letter to the CQC System Manager, signed by an authorized official of the firm, which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters.

3.2.1.4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.2.1.5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Use only Government approved Laboratory facilities.

3.2.1.6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.1.7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

3.2.1.8. Reporting procedures, including proposed reporting formats.

3.2.1.9. A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.1.10. A list of all inspections required by the International Codes and the special inspection program required by the code and this contract.

### 3.2.2. Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and

provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

3.2.2.2. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists at each design phase as part of the project documentation.

3.2.2.3. A Design Quality Control Manager, who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated, shall implement the DQC Plan. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Government, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

### 3.2.3. Acceptance of Plan

Government acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

### 3.2.4. Notification of Changes

After acceptance of the CQC Plan, notify the Government in writing of any proposed change. Proposed changes are subject to Government acceptance.

## 3.3. COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, the Contractor and the Government shall meet and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare minutes of the meeting for signature by both parties. The minutes shall become a part of the contract file. There may be occasions when either party will call for subsequent conferences to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

## 3.4. QUALITY CONTROL ORGANIZATION

### 3.4.1. Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure contract compliance. The CQC organization shall also include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly furnish complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be

responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

#### 3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). Identify an alternate for the CQC System Manager in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager but the alternate may have other duties in addition to serving in a temporary capacity as the acting QC manager.

#### 3.4.3. CQC Personnel

3.4.3.1. In addition to CQC personnel specified elsewhere in the contract provide specialized CQC personnel to assist the CQC System Manager in accordance with paragraph titled Area Qualifications.

3.4.3.2. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; **are not intended to be full time, but must be physically present at the construction site during work on their areas of responsibility**; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan. **One person may cover more than one area, provided that they are qualified to perform QC activities for the designated areas below and provided that they have adequate time to perform their duties:**

#### 3.4.4. Experience Matrix

##### 3.4.4.1. Area Qualifications

3.4.4.1.1. Civil - Graduate Civil Engineer or (BA/BS) graduate in construction management with 4 years experience in the type of work being performed on this project or engineering technician with 5 yrs related experience.

3.4.4.1.2. Mechanical - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Mechanical Inspector with 5 yrs related experience.

3.4.4.1.3. Electrical - Graduate Electrical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Electrical Inspector with 5 yrs related experience.

3.4.4.1.4. Structural - Graduate Structural Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or person with an ICC certification as a Reinforced Concrete Special Inspector and Structural Steel and Bolting Special Inspector (as applicable to the type of construction involved) with 5 yrs related experience.

3.4.4.1.5. Plumbing - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience, or person with an ICC certification as a Commercial Plumbing Inspector with 5 yrs related experience.

3.4.4.1.6. Concrete, Pavements and Soils Materials Technician (present while performing tests) with 2 yrs experience for the appropriate area

3.4.4.1.7. Testing, Adjusting and Balancing Specialist must be a member (TAB) Personnel of AABC or an experienced technician of the firm certified by the NEBB (present while testing, adjusting, balancing).

3.4.4.1.8. Design Quality Control Manager Registered Architect or Professional Engineer (not required on the construction site)

3.4.4.1.9. Registered Fire Protection Engineer with 4 years related experience or engineering technician with 5 yrs related experience (but see requirements for Fire Protection Engineer of Record to witness final testing in Section 01 10 00, paragraph 5.10, Fire Protection).

3.4.4.1.10. QC personnel assigned to the installation of the telecommunication system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification. In lieu of BICSI certification, QC personnel shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. QC personnel shall witness and certify the testing of telecommunications cabling and equipment.

### 3.4.5. Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is periodically offered at Fort Worth District, Corps of Engineers Office, Federal Building, Room 1A03, 819 Taylor Street, Fort Worth, Texas. Inquire of the District or Division sponsoring the course for fees and other expenses involved, if any, for attendance at this course.

### 3.4.6. Organizational Changes

When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

## 3.5. SUBMITTALS AND DELIVERABLES

Make submittals as specified in Section 01 33 00 **SUBMITTAL PROCEDURES**. The CQC organization shall certify that all submittals and deliverables are in compliance with the contract requirements.

## 3.6. CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The CQC organization shall conduct at least three phases of control for each definable feature of the construction work as follows:

### 3.6.1. Preparatory Phase

Perform this phase prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

3.6.1.1. A review of each paragraph of applicable specifications, reference codes, and standards. Make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field at the preparatory inspection. Maintain these copies in the field, available for use by Government personnel until final acceptance of the work.

3.6.1.2. A review of the contract drawings.

3.6.1.3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

3.6.1.4. Review of provisions that have been made to provide required control inspection and testing.

3.6.1.5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

3.6.1.6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

3.6.1.7. A review of the appropriate activity hazard analysis to assure safety requirements are met.

3.6.1.8. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

3.6.1.9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

3.6.1.10. Discussion of the initial control phase.

3.6.1.11. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

### 3.6.2. Initial Phase

Accomplish this phase at the beginning of a definable feature of work. Include the following actions:

3.6.2.1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

3.6.2.2. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

3.6.2.3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

3.6.2.4. Resolve all differences.

3.6.2.5. Check safety to include compliance with and upgrading of the Accident Prevention plan and activity hazard analysis. Review the activity analysis with each worker.

3.6.2.6. Notify the Government at least 24 hours in advance of beginning the initial phase. The CQC System Manager shall prepare and attach to the daily CQC report separate minutes of this phase. Indicate exact location of initial phase for future reference and comparison with follow-up phases.

3.6.2.7. Repeat the initial phase any time acceptable specified quality standards are not being met.

### 3.6.3. Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Conduct final follow-up checks and correct deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

### 3.6.4. Additional Preparatory and Initial Phases



Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

### 3.7. TESTS

#### 3.7.1. Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements and project design documents. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory, or establish an approved testing laboratory at the project site. The Contractor may elect to use a laboratory certified and accredited by the Concrete and cement Reference Laboratory (CCRL) or by AASHTO Materials Reference Laboratory (AMRL) for testing procedures that those organizations certify. The Contractor shall perform the following activities and record and provide the following data:

3.7.1.1. Verify that testing procedures comply with contract requirements and project design documents.

3.7.1.2. Verify that facilities and testing equipment are available and comply with testing standards.

3.7.1.3. Check test instrument calibration data against certified standards.

3.7.1.4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

3.7.1.5. Include results of all tests taken, both passing and failing tests, recorded on the CQC report for the date taken. Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

#### 3.7.2. Testing Laboratories

##### 3.7.2.1. Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

##### 3.7.2.2. Capability Recheck

If the selected laboratory fails the capability check, the Government will assess the Contractor a charge of \$1,375 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

#### 3.7.3. Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

#### 3.7.4. Furnishing or Transportation of Samples for Government Quality Assurance Testing

The Contractor is responsible for costs incidental to the transportation of samples or materials. Deliver samples of materials for test verification and acceptance testing by the Government to the Corps of Engineers Laboratory, f.o.b., at the following address:

- For delivery by mail:  
Area Office designated laboratory  
N/A  
N/A  
N/A
- For other deliveries:  
Area Office designated laboratory  
N/A  
N/A  
N/A

The area or resident office will coordinate, exact delivery location, and dates for each specific test.

### 3.8. COMPLETION INSPECTION

#### 3.8.1. Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. Prepare a punch list of items which do not conform to the approved drawings and specifications and include in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

#### 3.8.2. Pre-Final Inspection

As soon as practicable after the notification above, the Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. Accomplish these inspections and any deficiency corrections required by this paragraph within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

#### 3.8.3. Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall attend the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also attend. The Government will formally schedule the final acceptance inspection based upon results of the Pre-Final inspection. Provide notice to the Government at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

### 3.9. DOCUMENTATION

3.9.1. Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers using government-provided software, QCS (see Section 01 45 01.10). The report includes, as a minimum, the following information:

- 3.9.1.1. Contractor/subcontractor and their area of responsibility.
  - 3.9.1.2. Operating plant/equipment with hours worked, idle, or down for repair.
  - 3.9.1.3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
  - 3.9.1.4. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the applicable control phase (Preparatory, Initial, Follow-up). List deficiencies noted, along with corrective action.
  - 3.9.1.5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
  - 3.9.1.6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
  - 3.9.1.7. Offsite surveillance activities, including actions taken.
  - 3.9.1.8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
  - 3.9.1.9. Instructions given/received and conflicts in plans and/or specifications.
  - 3.9.1.10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identity of the ITR team, the ITR review comments, responses and the record of resolution of the comments.
- 3.9.2. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, submit one report for every 7 days of no work and on the last day of a no work period. Account for all calendar days throughout the life of the contract. The first report following a day of no work shall be for that day only. The CQC System Manager shall sign and date reports. The report shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel. The Contractor may submit these forms electronically, in lieu of hard copy.

### 3.10. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

End of Section 01 45 04.00 10

**SECTION 01 50 02  
TEMPORARY CONSTRUCTION FACILITIES**

**1.0 OVERVIEW**

1.1. GENERAL REQUIREMENTS

1.2. AVAILABILITY AND USE OF UTILITY SERVICES

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.4. PROTECTION AND MAINTENANCE OF TRAFFIC

1.5. MAINTENANCE OF CONSTRUCTION SITE

## 1.0 OVERVIEW

### 1.1. GENERAL REQUIREMENTS

#### 1.1.1. Site Plan

Prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Also indicate if the use of a supplemental or other staging area is desired.

### 1.2. AVAILABILITY AND USE OF UTILITY SERVICES

1.2.1. See Section 00 72 00, Contract Clauses and Section 00 73 00, Special Contract Requirements, for Utility Availability requirements.

#### 1.2.2. Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

#### 1.2.3. Telephone

Make arrangements and pay all costs for desired telephone facilities.

### 1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

#### 1.3.1. Bulletin Board

Immediately upon beginning of onsite work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Display legible copies of the aforementioned data until work is completed. Remove the bulletin board from the site upon completion of the project.

#### 1.3.2. Project and Safety Signs

Erect a project sign and a site safety sign with informational details as provided by the Government at the Post award conference, within 15 days prior to any work activity on project site. Update the safety sign data daily, with light colored metallic or non-metallic numerals. Remove the signs from the site upon completion of the project. Engineer Pamphlet EP 310-1-6a contains the standardized layout and construction details for the signs. It can be found through a GOOGLE Search or try <http://www.usace.army.mil/publications/eng-pamphlets/ep310-1-6a/s-16.pdf>.

### 1.4. PROTECTION AND MAINTENANCE OF TRAFFIC

Provide access and temporary relocated roads as necessary to maintain traffic. Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Take measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property.

The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. Investigate the adequacy of existing roads and the allowable load limit on these roads. Repair any damage to roads caused by construction operations.

#### 1.4.1. Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Construct haul roads with suitable grades and widths. Avoid sharp curves, blind corners, and dangerous cross traffic. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Provide adequate lighting to assure full and clear visibility for full width of haul road and work areas during any night work operations. Remove haul roads designated by the Contracting Officer upon completion of the work and restore those areas.

#### 1.4.2. Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

#### 1.5. MAINTENANCE OF CONSTRUCTION SITE

Mow grass and vegetation located within the boundaries of the construction site for the duration of the project, from NTP to contract completion. Edge or neatly trim grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers from NTP to contract completion.

End of Section 01 50 02

**SECTION 01 57 20.00 10  
ENVIRONMENTAL PROTECTION**

**1.0 GENERAL REQUIREMENTS**

- 1.1. SUBCONTRACTORS
- 1.2. ENVIRONMENTAL PROTECTION PLAN
- 1.3. PROTECTION FEATURES
- 1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS
- 1.5. NOTIFICATION

**2.0 PRODUCTS (NOT USED)**

**3.0 EXECUTION**

- 3.1. LAND RESOURCES
- 3.2. WATER RESOURCES
- 3.3. AIR RESOURCES
- 3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL
- 3.5. RECYCLING AND WASTE MINIMIZATION
- 3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES
- 3.7. BIOLOGICAL RESOURCES
- 3.8. INTEGRATED PEST MANAGEMENT
- 3.9. PREVIOUSLY USED EQUIPMENT
- 3.10. MILITARY MUNITIONS
- 3.11. TRAINING OF CONTRACTOR PERSONNEL
- 3.12. POST CONSTRUCTION CLEANUP

## 1.0 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations

### 1.1. SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

### 1.2. ENVIRONMENTAL PROTECTION PLAN

1.2.1. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Define issues of concern within the Environmental Protection Plan as outlined in this section. Address each topic in the plan at a level of detail commensurate with the environmental issue and required construction task(s). Identify and discuss topics or issues which are not identified in this section, but which the Contractor considers necessary, after those items formally identified in this section. Prior to commencing construction activities or delivery of materials to the site, submit the Plan for review and Government approval. The Contractor shall meet with the Government prior to implementation of the Environmental Protection Plan, for the purpose of discussing the implementation of the initial plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. Maintain and keep the Environmental Protection Plan current onsite.

#### 1.2.2. Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

#### 1.2.3. Contents

The plan shall include, but shall not be limited to, the following:

1.2.3.1. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

1.2.3.2. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable

1.2.3.3. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel

1.2.3.4. Description of the Contractor's environmental protection personnel training program

1.2.3.5. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. Include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

1.2.3.6. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site



1.2.3.7. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

1.2.3.8. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

1.2.3.9. Drawing showing the location of on-installation borrow areas.

1.2.3.10. A spill control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The spill control plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

- (a) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Government and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.
- (b) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup
- (c) Training requirements for Contractor's personnel and methods of accomplishing the training
- (d) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
- (e) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency
- (f) The methods and procedures to be used for expeditious contaminant cleanup

1.2.3.11. A solid waste management plan identifying waste minimization, collection, and disposals methods, waste streams (type and quantity), and locations for solid waste diversion/disposal including clearing debris and C&D waste that is diverted (salvaged, reused, or recycled). Detail the contractor's actions to comply with, and to participate in, Federal, state, regional, local government, and installation sponsored recycling programs to reduce the volume of solid waste at the source. Identify any subcontractors responsible for the transportation, salvage and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility. Attach evidence of the facility's ability to accept the solid waste to this plan. A construction and demolition waste management plan, similar to the plan specified in the UFGS 01 74 19 (formerly 01572) may be used as the non-hazardous solid waste management plan. Provide a Non-Hazardous Solid Waste Diversion Report. Submit the report on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and each quarter thereafter (e.g. the first working day of January, April, July, and October) until the end of the project. Additionally, a summary report, with all data fields, is required at the end of the project. The report shall indicate the total type and amount of waste generated, total type and amount of waste diverted, type and amount of waste sent to waste-to-energy facility and alternative daily cover, in tons along with the percent that was diverted. Maintain, track and report construction and demolition waste data in a manner such that the installation can enter the data into the Army SWAR database, which separates data by type of material. A cumulative report in LEED Letter Template format may be used but must be modified to include the date disposed of/diverted and include the above stated diversion data. NOTE: The Solid Waste Diversion Reports are separate documentation than the LEED documentation.

1.2.3.12. DELETED.

1.2.3.13. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

1.2.3.14. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of

these materials. In accordance with EM 385-1-1, include a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time in the contaminant prevention plan. Update the plan as new hazardous materials are brought on site or removed from the site. Reference this plan in the storm water pollution prevention plan, as applicable.

1.2.3.15. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented and any required permits. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, include documentation that the waste water treatment plant Operator has approved the flow rate, volume, and type of discharge.

1.2.3.16. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Government.

1.2.3.17. A pesticide treatment plan, updated, as information becomes available. Include: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. The Contractor is responsible for Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation specific requirements. Follow AR 200-1, Chapter 5, Pest Management, Section 5-4, "Program Requirements" for data required to be reported to the Installation.

### 1.3. PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Government shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. Both the Contractor and the Government will sign this survey, upon mutual agreement as to its accuracy and completeness. The Contractor develop a plan that depicts how it will protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

### 1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the Government and may require an extended review, processing, and approval time. The Government reserves the right to disapprove alternate methods, even if they are more cost effective, if the Government determines that the proposed alternate method will have an adverse environmental impact.

### 1.5. NOTIFICATION

The Government will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Government of the proposed corrective action and take such action when approved by the Government. The Government may issue an order stopping all or part of the

work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Government may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

## **2.0 PRODUCTS (NOT USED)**

## **3.0 EXECUTION**

### **3.1. LAND RESOURCES**

Confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. Do not attach or fasten any ropes, cables, or guys to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Remove all stone, soil, or other materials displaced into uncleared areas..

#### **3.1.1. Work Area Limits**

Prior to commencing construction activities, mark the areas that need not be disturbed under this contract. Mark or fence isolated areas within the general work area which are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. Personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

#### **3.1.2. Landscape**

Clearly identify trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

#### **3.1.3. Erosion and Sediment Controls**

Provide erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. Coordinate with approving authorities (federal, state, etc.) for specific requirements to be included in the plan. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. Keep the area of bare soil exposed at any one time by construction operations to a minimum necessary. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Remove any temporary measures after the area has been stabilized.

#### **3.1.4. Contractor Facilities and Work Areas**

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Government. Make only approved temporary movement or relocation of Contractor facilities. Provide erosion and sediment controls for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant and/or work areas to protect adjacent areas.

### **3.2. WATER RESOURCES**

Monitor construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. Monitor all water areas affected by construction activities. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by state or federally issued Clean Water Act permits.

### 3.2.1. Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments or impede state-designated flows.

### 3.2.2. Wetlands

Do not enter, disturb, destroy, or allow discharge of contaminants into any wetlands.

## 3.3. AIR RESOURCES

Comply with all Federal and State air emission and performance laws and standards for equipment operation, activities, or processes.

### 3.3.1. Particulates

Control dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods are permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

### 3.3.2. Odors

Control odors from construction activities at all times. Odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

### 3.3.3. Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the state and Installation rules.

### 3.3.4. Burning

Burning is not allowed on the project site unless specified in other sections of the specifications or by written authorization. Specific times, locations, and manners of burning shall be subject to approval.

## 3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

### 3.4.1. Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Conduct handling, storage, and disposal to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. The minimum acceptable off-site solid waste disposal option is a Subtitle D RCRA permitted landfill. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Comply with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

### 3.4.2. Chemicals and Chemical Wastes

Dispense chemicals, ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. The Government may periodically review this documentation. Collect chemical waste in corrosion resistant, compatible containers. Monitor and remove collection drums to a staging or storage area when contents are within 6 inches of the top. Classify, manage, store, and dispose of wastes in accordance with Federal, State, and local laws and regulations.

#### 3.4.3. Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable state and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes; protect it from the weather by placing it in a safe covered location and take precautionary measures, such as berming or other appropriate measures, against accidental spillage. Store, describe, package, label, mark, and placard hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, state, and local laws and regulations. Transport Contractor generated hazardous waste off Government property in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Immediately report spills of hazardous or toxic materials to the Government and the Facility Environmental Office. Contractor will be responsible for cleanup and cleanup costs due to spills. Contractor is responsible for the disposition of Contractor generated hazardous waste and excess hazardous materials.

#### 3.4.4. Fuel and Lubricants

Conduct storage, fueling and lubrication of equipment and motor vehicles in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations.

### 3.5. RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project. Line and berm fueling areas and establish storm water control structures at discharge points for site run-off. Keep a liquid containment clean-up kit available at the fueling area.

### 3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings. Protect and preserve these resources during the life of the Contract. Temporarily suspend all activities that may damage or alter such resources, if any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found during excavation or other construction activities. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, notify the Government so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

### 3.7. BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitat. Protect threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

### 3.8. INTEGRATED PEST MANAGEMENT

Coordinate, through the Government, with the Installation Pest Management Coordinator (IPMC) at the earliest possible time prior to pesticide application, in order to minimize impacts to existing fauna and flora. Discuss

integrated pest management strategies with the IPMC and receive concurrence from the IPMC, through the COR, prior to the application of any pesticide associated with these specifications. Give IMPC personnel the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. The use and management of pesticides are regulated under 40 CFR 152 - 186.

#### 3.8.1. Pesticide Delivery and Storage

Deliver pesticides, approved for use on the Installation, to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

#### 3.8.2. Qualifications

Use the services of a subcontractor for pesticide application whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed.

#### 3.8.3. Pesticide Handling Requirements

Formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions.

#### 3.8.4. Application

A state certified pesticide applicator shall apply pesticides in accordance with EPA label restrictions and recommendations.

### 3.9. PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

### 3.10. MILITARY MUNITIONS

Immediately stop work in that area and immediately inform the Government, in the event military munitions, as defined in 40 CFR 260, are discovered or uncovered.

### 3.11. TRAINING OF CONTRACTOR PERSONNEL

Train personnel in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. The training and meeting agenda shall include methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

### 3.12. POST CONSTRUCTION CLEANUP

Clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade, fill and seed the entire disturbed area, unless otherwise indicated.

**SECTION 01 62 35  
RECYCLED/RECOVERED MATERIAL**

**1.0 GENERAL**

1.1. REFERENCES

1.2. OBJECTIVES

1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

## 1.0 GENERAL

### 1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
- 40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

### 1.2. OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

### 1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials, when incorporated into the work under this contract, shall contain at least the minimum percentage of recycled or recovered materials indicated by EPA unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

### 1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

### 1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be use by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

End of Section 01 62 35



**SECTION 01 78 02.00 10  
CLOSEOUT SUBMITTALS**

**1.0 OVERVIEW**

- 1.1. SUBMITTALS
- 1.2. PROJECT RECORD DOCUMENTS
- 1.3. EQUIPMENT DATA
- 1.4. CONSTRUCTION WARRANTY MANAGEMENT
- 1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING
- 1.6. OPERATION AND MAINTENANCE MANUALS
- 1.7. FIELD TRAINING
- 1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY
- 1.9. LEED REVIEW MEETINGS
- 1.10. RED ZONE MEETING
- 1.11. FINAL CLEANING
- 1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY"

**EXHIBIT 1 SAMPLE RED ZONE MEETING CHECKLIST**

## 1.0 OVERVIEW

### 1.1. SUBMITTALS

Government approval is required for any submittals with a "G" designation; submittals not having a "G" designation are for Designer of Record approval or for information only. Submit the following in accordance with Section 01 33 00 submittals:

#### SD-02 Shop Drawings

- As-Built Drawings - G
  - Drawings showing final as-built conditions of the project. Provide electronic drawing files as specified in Section 01 33 16, 3 sets of blue-line prints and one set of the approved working as-built drawings.

#### SD-03 Product Data

- As-Built Record of Equipment and Materials
  - Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.
- Construction Warranty Management Plan
  - Three sets of the construction warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.
- Warranty Tags
  - Two record copies of the warranty tags showing the layout and design.
- Final Cleaning
  - Two copies of the listing of completed final clean-up items.

### 1.2. PROJECT RECORD DOCUMENTS

#### 1.2.1. As-Built Drawings – G

An as-built drawing is a construction drawing revised to reflect the final as-built conditions of the project as a result of modifications and corrections to the project design required during construction. The final as-built drawings shall not have the appearance of marked up drawings, but that of professionally prepared drawings as if they were the "as designed" drawings.

#### 1.2.2. Maintenance of As-Built Drawings

1.2.2.1. The Configuration Management Plan shall describe how the Contractor will maintain up-to-date drawings, how it will control and designate revisions to the drawings and specifications (In accordance with Special Contract Requirement: ***Deviating from the Accepted Design*** and Section 01 33 16: ***Design after Award***, the Designer of Record's approval is necessary for any revisions to the accepted design).

1.2.2.2. Make timely updates, carefully maintaining a record set of working as-built drawings at the job site, marked in red, of all changes and corrections from the construction drawings. Enter changes and corrections on drawings promptly to reflect "Current Construction". Perform this update no less frequently than weekly for the blue line drawings and update no less frequently than quarterly for the CADD/CAD and BIM files, which were prepared previously in accordance with Section 01 33 16. Include a confirmation that the as-builts are up to date with the submission of the monthly project schedule.

1.2.2.3. If the DB Contractor fails to maintain the as-built drawings as required herein, the Government will retain from the monthly progress payment, an amount representing the estimated monthly cost of maintaining the as-built drawings. Final payment with respect to separately priced facilities or the contract as a whole will be withheld until the Contractor submits acceptable as-built drawings and the Government approves them.

1.2.2.4. The marked-up set of drawings shall reflect any changes, alterations, adjustments or modifications. Changes must be reflected on all sheets affected by the change. Changes shall include marking the drawings to reflect structural details, foundation layouts, equipment sizes, and other extensions of design.

1.2.2.5. Typically, room numbers shown on the drawings are selected for design convenience and do not represent the actual numbers intended for use by the end user. Final as-built drawings shall reflect actual room numbers adopted by the end user.

1.2.2.6. If there is no separate contract line item (CLIN) for as-built drawings, the Government will withhold the amount of \$35,000, or 1% of the present construction value, whichever is the greater, until the final as-built drawing submittal has been approved by the Government.

### 1.2.3. Underground Utilities

The drawings shall indicate, in addition to all changes and corrections, the actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Locate Valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Record average elevation of the top of each run or underground structure..

### 1.2.4. Partial Occupancy

For projects where portions of construction are to be occupied or activated before overall project completion, including portions of utility systems, supply as-built drawings for those portions of the facility being occupied or activated at the time the facility is occupied or activated. Show this same as-built information previously furnished on the final set of as-built drawings.

### 1.2.5. As-Built Conditions That are Different From the construction Drawings

Accurately reflect all as-built conditions that are different, such as dimensions, road alignments and grades, and drainage and elevations, from the construction drawings on each drawing. If the as-built condition is accurately reflected on a shop drawing, then furnish that shop drawing in CADD format. Reference the final as-built construction drawing the shop drawing file that includes the as-built information. In turn, the shop drawing shall reference the applicable construction as-built drawing. Delete any options shown on drawings and not selected clearly reflect options selected on final as-built drawings.

### 1.2.6. Additional As-Built Information that Exceeds the Detail Shown on the construction Drawings:

These as-built conditions include those that reflect structural details, foundation layouts, equipment, sizes, mechanical and electrical room layouts and other extensions of design, that were not shown in the project design documents because the exact details were not known until after the time of approved shop drawings. It is recognized that these shop drawing submittals (revised showing as-built conditions) will serve as the as-built record without actual incorporation into the construction drawings, piping, and equipment drawings. Include locations of all explorations, logs of all explorations, and results of all laboratory testing, including those provided by the Government. Furnish all such shop drawings in CADD /CADformat. Include fire protection details, such as wiring, performed for the design of the project.

### 1.2.7. Final As-Built Drawings

Submit final as-built CADD/CAD and BIM Model(s) and Facility Data files at the time of Beneficial Occupancy of the project or at a designated phase of the project. In the event the Contractor accomplishes additional work after this submittal, which changes the as-built conditions, submit a new DVD with all drawing sheets and three blue-line copies of affected sheets which depict additional changes.

### 1.2.8. Title Blocks

In accordance with the configuration management plan, clearly mark title blocks to indicate final as-built drawings.

### 1.2.9. Other As-Built Documents

Provide scans of all other documents such as design analysis, catalog cuts, certification documents that are not available in native electronic format in an organized manner in Adobe.pdf format.

#### 1.2.9.1. LEED Documentation

Update LEED documentation on at least a monthly basis and have it available for review by the Government on the jobsite at all times during construction. Submit the final LEED Project Checklist(s), final LEED submittals checklist and complete project documentation, verifying the final LEED score and establishing the final rating. Provide full support to the validation review process, including credit audits. See also the LEED documentation requirements in Section 01 33 16, DESIGN AFTER AWARD.

#### 1.2.9.2. GIS Documentation

Provide final geo-referenced GIS database of the new building footprint along with any changes made to exterior of the building. The intent of capturing the final building footprint and exterior modifications in a GIS database is to provide the installation with a data set of the comprehensive changes made to the landscape as a result of the construction project. The Government will incorporate this data set into the installations existing GIS MasterPlan or Enterprise GIS system. The GIS database deliverable shall follow a standard template provided to the Contractor by the Government, adhere to detailed specifications outlined in ECB No 2006-15, and be documented using the Federal Geographic Data Committee (FGDC) metadata standard.

### 1.3. EQUIPMENT DATA

#### 1.3.1. Real Property Equipment

Provide an Equipment-in-Place list of all installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. Include the cost of each piece of installed property F.O.B. construction site. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, provide the following information: The name, serial and model number address of equipment supplier, or manufacturer originating the guaranteed item. The Contractor's guarantee to the Government of these items will not be limited by the terms of any manufacturer's guarantee to the Contractor. Furnish the list as one (1) reproducible and three (3) copies thirty (30) calendar days before completion of any segment of the contract work which has an incremental completion date.

#### 1.3.2. Maintenance and Parts Data

Furnish a brochure, catalog cut, parts list, manufacturer's data sheet or other publication showing detailed parts data on all other equipment subject to repair and maintenance procedures not otherwise required in Operations and Maintenance Manuals specified elsewhere in this contract. Distribution of directives shall follow the same requirements as listed in paragraph above.

#### 1.3.3. Construction Specifications

Furnish permanent electronic files of final as-built construction specifications, including modifications thereto, with the as-built drawings.

### 1.4. CONSTRUCTION WARRANTY MANAGEMENT

1.4.1. Prior to the end of the one year warranty, the Government may conduct an infrared roof survey on any project involving a membrane roofing system. This survey will be conducted in accordance with ASTM C1153-90, "Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging". The Contractor shall replace all damaged materials and locate and repair sources of moisture penetration.

## 1.4.2. Management

### 1.4.2.1. Warranty Management Plan

Develop a warranty management plan containing information relevant to the clause **Warranty of Construction** in FAR 52.246-21. Submit the warranty management plan for Government approval at least 30 days before the planned pre-warranty conference. In the event of phased turn-over of the contract, update the Warranty Management Plan as necessary to include latest information required. Include all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. Submit warranty information made available during the construction phase prior to each monthly pay estimate. Assemble information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period shall begin on the date of project acceptance and shall continue for the full product warranty period. The Contractor, Government, including the Customer Representative shall jointly conduct warranty inspections, 4 months and 9 months, after acceptance. The warranty management plan shall include, but shall not be limited to, the following information:

- (1) Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the contractors, subcontractors, manufacturers or suppliers involved.
- (2) Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- (3) A list for each warranted equipment, item, feature of construction or system indicating:
  - (i) Name of item.
  - (ii) Model and serial numbers.
  - (iii) Location where installed.
  - (iv) Name and phone numbers of manufacturers or suppliers.
  - (v) Names, addresses and telephone numbers of sources of spare parts.
  - (vi) Warranties and terms of warranty. Include one-year overall warranty of construction. Indicate those items, which have extended warranties with separate warranty expiration dates.
  - (vii) Cross-reference to warranty certificates as applicable.
  - (viii) Starting point and duration of warranty period.
  - (ix) Summary of maintenance procedures required to continue the warranty in force.
  - (x) Cross-reference to specific pertinent Operation and Maintenance manuals.
  - (xi) Organization, names and phone numbers of persons to call for warranty service.
  - (xii) Typical response time and repair time expected for various warranted equipment.
- (4) The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.
- (5) Procedure and status of tagging of all equipment covered by extended warranties.
- (6) Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

## 1.4.3. Performance Bond

1.4.3.1. The Contractor's Performance Bond will remain effective throughout the construction warranty period.

1.4.3.2. In the event the Contractor or his designated representative(s) fails to commence and diligently pursue any work required under this clause, and in a manner pursuant to the requirements thereof, the Government shall have

a right to demand that said work be performed under the Performance Bond by making written notice on the surety. If the surety fails or refuses to perform the obligation it assumed under the Performance Bond, the Government shall have the work performed by others, and after completion of the work, may make demand for reimbursement of any or all expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

1.4.3.3. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Government will have the right to recoup expenses from the bonding company.

1.4.3.4. Following oral or written notification of required warranty repair work, the Contractor will respond as dictated by para. 1.4.5. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Government to proceed against the Contractor as outlined in the paragraph 1.4.5.5 and/or above.

#### 1.4.4. Pre-Warranty Conference

Prior to contract completion, or completion of any phase or portion of contract to be turned over, and at a time designated by the Contracting Officer, the Contractor shall meet with the Government to develop a mutual understanding with respect to the requirements of this clause. Communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Government for the execution of the construction warranty shall be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor will furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warrantied construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of his responsibilities in connection with other portions of this provision.

#### 1.4.5. Contractor's Response to Warranty Service Requirements.

Following Government oral or written notification, which may include authorized installation maintenance personnel, the Contractor shall respond to warranty service requirements in accordance with the "Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and backcharge the construction warranty payment item established.

1.4.5.1. First Priority Code 1 Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

1.4.5.2. Second Priority Code 2 Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

1.4.5.3. Third Priority Code 3 All other work to be initiated within 3 work days and work continuously to completion or relief.

1.4.5.4. The "Warranty Service Priority List" is as follows:

- Code 1 - Air Conditioning System
  - (a) Buildings with computer equipment.
  - (b) Barracks, mess halls (entire building down).
- Code 2 - Air Conditioning Systems
  - (a) Recreational support.
  - (b) Air conditioning leak in part of building, if causing damage.
  - (c) Air conditioning system not cooling properly

- (d) Admin buildings with Automated Data Processing (ADP) equipment not on priority list.
  - Code 1 - Doors
- (a) Overhead doors not operational.
  - Code 1 - Electrical
- (a) Power failure (entire area or any building operational after 1600 hours).
- (b) Traffic control devices.
- (c) Security lights.
- (d) Smoke detectors and fire alarm systems
- (e) Power or lighting failure to an area, facility, portion of a facility, which may adversely impact health, safety, security, or the installation's mission requirement, or which may result in damage to property.
  - Code 2 - Electrical
- (a) Power failure (no power) for unoccupied buildings or portions thereof or branch circuits within occupied buildings, not listed as Code 1.
- (a) Receptacle and lights, not listed as code 1.
  - Code 3 - Electrical
- (a) Street, parking area lights
  - Code 1 - Gas
- (a) Leaks and breaks.
- (b) No gas to cantonment area.
  - Code 1 - Heat
- (a) Area power failure affecting heat.
- (b) Heater in unit not working.
  - Code 2 Heat
- (a) All heating system failures not listed as Code 1.
  - Code 3 - Interior
- (a) Floor damage
- (b) Paint chipping or peeling
  - Code 1 - Intrusion Detection Systems - N/A.
  - Code 2 - Intrusion Detection Systems other than those listed under Code 1
  - Code 1 - Kitchen Equipment
- (a) Dishwasher.
- (b) All other equipment hampering preparation of a meal.
  - Code 2 - Kitchen Equipment
- (a) All other equipment not listed under Code 1.
  - Code 2 - Plumbing
- (a) Flush valves not operating properly
- (b) Fixture drain, supply line commode, or water pipe leaking.
- (c) Commode leaking at base.
  - Code 3 - Plumbing
- (a) Leaking faucets

- Code 1 - Refrigeration
  - (a) Mess Hall.
  - (b) Medical storage.
- Code 2 - Refrigeration
  - (a) Mess hall - other than walk-in refrigerators and freezers.
- Code 1 - Roof Leaks
  - (a) Temporary repairs will be made where major damage to property is occurring.
- Code 2 - Roof Leaks
  - (a) Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.
- Code 1 - Sprinkler System
  - (a) All sprinkler systems, valves, manholes, deluge systems, and air systems to sprinklers.
- Code 1 - Tank Wash Racks (Bird Baths)
  - (a) All systems which prevent tank wash.
- Code 1 - Water (Exterior)
  - (a) Normal operation of water pump station.
- Code 2 - Water (Exterior)
  - (a) No water to facility.
- Code 1 - Water, Hot (and Steam)
  - (a) Barracks (entire building).
- Code 2 - Water, Hot
  - (a) No hot water in portion of building listed under Code 1

1.4.5.5. Should parts be required to complete the work and the parts are not immediately available, the Contractor shall have a maximum of 12 hours after arrival at the job site to provide the Government, with firm written proposals for emergency alternatives and temporary repairs for Government participation with the Contractor to provide emergency relief until the required parts are available on site for the Contractor to perform permanent warranty repair. The Contractor's proposals shall include a firm date and time that the required parts shall be available on site to complete the permanent warranty repair. The Government will evaluate the proposed alternatives and negotiate the alternative considered to be in the best interest of the Government to reduce the impact of the emergency condition. Alternatives considered by the Government will include the alternative for the Contractor to "Do Nothing" while waiting until the required parts are available to perform permanent warranty repair. Negotiating a proposal which will require Government participation and the expenditure of Government funds shall constitute a separate procurement action by the using service.

#### 1.4.6. Equipment Warranty Identification Tags

1.4.6.1. Provide warranty identification tags at the time of installation and prior to substantial completion shall provide warranty identification tags on all Contractor and Government furnished equipment which the Contractor has installed.

- (a) The tags shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and they shall be installed in a position that is easily (or most easily) noticeable. Tag each component of contractor furnished equipment that has differing warranties on its components.
- (b) Submit sample tags, representing how the other tags will look, for Government review and approval.
- (c) Tags for Warranted Equipment: The tag for this equipment shall be similar to the following: Exact format and size will be as approved.



---

EQUIPMENT WARRANTY - CONTRACTOR FURNISHED EQUIPMENT

MFG NAME MODEL NO.

SERIAL NO.

CONTRACT NO.

CONTRACTOR NAME

CONTRACTOR WARRANTY EXPIRES

MFG WARRANTY(IES) EXPIRE

---

---

EQUIPMENT WARRANTY - GOVERNMENT FURNISHED EQUIPMENT

MFG NAME MODEL NO.

SERIAL NO.

CONTRACT NO.

DATE EQUIP PLACED IN SERVICE

MFG WARRANTY(IES) EXPIRE

---

(d) If the manufacturer's name (MFG), model number and serial number are on the manufacturer's equipment data plate and this data plate is easily found and fully legible, this information need not be duplicated on the equipment warranty tag

1.4.6.2. Execution: Complete the required information on each tag and install these tags on the equipment by the time of and as a condition of final acceptance of the equipment.

## 1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING

Submit; all reports, statements, certificates, and completed checklists for testing, adjusting, balancing, and commissioning of mechanical systems prior to final inspection and transfer of the completed facility for approval, as specified in applicable technical specification sections.

## 1.6. OPERATION AND MAINTENANCE MANUALS

### 1.6.1. General Requirements

1.6.1.1. Inasmuch as the operations and maintenance manuals are required to operate and maintain the facility, the operations and maintenance (O&M) manuals will be considered a requirement prior to substantial completion of any facility to be turned over to the Government. Beneficial occupancy of all or portions of a facility prior to substantial completion will not relieve the Contractor of liquidated damages, if substantial completion exceeds the required completion date.

1.6.1.2. Provide one permanent electronic copy on CD-ROM and 2 hard copies of the Equipment Operating, Maintenance, and Repair Manuals. Provide separate manuals for each utility system as defined hereinafter. Submit Operations and Maintenance manuals for approval before field training or 90 days before substantial completion (whichever occurs earlier). If there is no separate CLIN for O&M Manuals, the Government will withhold an amount representing \$20,000, as non-progressed work, until submittal and approval of all O&M manuals are complete.

### 1.6.2. Definitions

#### 1.6.2.1. Equipment

A single piece of equipment operating alone or in conjunction with other equipment to accomplish a system function.

#### 1.6.2.2. System

A combination of one or more pieces of equipment which function together to accomplish an intended purpose (i.e. HVAC system is composed of many individual pieces of equipment such as fans, motors, compressors, valves, sensors, relays, etc.)

### 1.6.3. Hard Cover Binders

The manuals shall be hard cover with posts, or 3-ring binders, so sheets may be easily substituted. Print the following identification on the cover: the words "EQUIPMENT OPERATING, MAINTENANCE, AND REPAIR MANUALS," the project name, building number, and an indication of utility or systems covered, the name of the Contractor, and the Contract number. Manuals shall be approximately 8-1/2 by 11-inches with large sheets folded in and capable of being easily pulled out for reference. All manuals for the project must be similar in appearance, and be of professional quality.

### 1.6.4. Warning Page

Provide a warning page to warn of potential dangers (if they exist, such as high voltage, toxic chemicals, flammable liquids, explosive materials, carcinogens, high pressures, etc.). Place the warning page inside the front cover and in front of the title page. Include any necessary Material Safety Data Sheets (MSDS) here.

### 1.6.5. Title Page

The title page shall include the same information shown on the cover and show the name of the preparing firm and the date of publication.

#### 1.6.6. Table of Contents

Each volume of the set of manuals for this project shall include a table of contents, for the entire set, broken down by volume.

#### 1.6.7. GENERAL

Organize manuals according to the following format, and include information for each item of equipment. Submit a draft outline and table of contents for approval at 50% contract completion.

#### TABLE OF CONTENTS

##### PART I: Introduction

- Equipment Description
- Functional Description
- Installation Description

##### PART II: Operating Principles

##### PART III: Safety

##### PART IV: Preventive Maintenance

- Preventive Maintenance Checklist, Lubrication
- Charts and Diagrams

##### PART V: Spare Parts Lists

- Troubleshooting Guide
- Adjustments
- Common Repairs and Parts Replacement

##### PART VI: Illustrations

#### 1.6.7.1. Part I-Introduction

Part I shall provide an introduction, equipment or system description, functional description and theory of operation, and installation instructions for each piece of equipment. Include complete instructions for uncrating, assembly, connection to the power source and pre-operating lubrication in the installation instructions as applicable. Illustrations, including wiring and cabling diagrams, are required as appropriate in this section. Include halftone pictures of the equipment in the introduction and equipment description, as well as system layout drawings with each item of equipment located and marked. Do not use copies of previously submitted shop drawings in these manuals.

#### 1.6.7.2. Part II-Operating Principles

Part II shall provide complete instructions for operating the system, and each piece of equipment. Illustrations, halftone pictures, tables, charts, procedures, and diagrams are required when applicable. This will include step-by-step procedures for start-up and shutdown of both the system and each component piece of equipments, as well as adjustments required to obtain optimum equipment performance, and corrective actions for malfunctions. Show performance sheets and graphs showing capacity data, efficiencies, electrical characteristics, pressure drops, and flow rates here, also. Marked-up catalogs or catalog pages do not satisfy this requirement. Present performance information as concisely as possible with only data pertaining to equipment actually installed. Include actual test data collected for Contractor performance here.

#### 1.6.7.3. Part III-Safety

Part III shall contain the general and specific safety requirements peculiar to each item of equipment. Repeat safety information as notes cautions and warnings in other sections where appropriate to operations described.

#### 1.6.7.4. Part IV-Preventive Maintenance

Part IV shall contain a troubleshooting guide, including detailed instructions for all common adjustments and alignment procedures, including a detailed maintenance schedule. Also include a diagnostic chart showing symptoms and solutions to problems. Include test hookups to determine the cause, special tools and test equipment, and methods for returning the equipment to operating conditions. Information may be in chart form or in tabular format with appropriate headings. Include instructions for the removal, disassembly, repair, reassembly, and replacement of parts and assemblies where applicable and the task is not obvious.

#### 1.6.7.5. Part V-Spare Parts List

Part V shall contain a tabulation of description data and parts location illustrations for all mechanical and electrical parts. The heading of the parts list shall clearly identify the supplier, purchase order number, and equipment. Include the unit price for each part. List parts by major assemblies, and arrange the listing in columnar form. Include names and addresses of the nearest manufacturer's representatives, as well as any special warranty information. Provide a list of spare parts that are recommended to be kept in stock by the Government installation.

#### 1.6.7.6. Part VI-Illustrations

Part VI shall contain assembly drawings for the complete equipment or system and for all major components. Include complete wiring diagrams and schematics. Other illustrations, such as exploded views, block diagrams, and cutaway drawings, are required as appropriate.

#### 1.6.8. Framed Instructions

Post framed instructions are required for substantial completion. Post framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, including equipment, ductwork, piping valves, dampers, and control sequence at a location near the equipment described. Prepare condensed operating instructions explaining preventive maintenance procedures methods of checking the system for normal safe operation, valve schedule and procedures for safely starting and stopping the system in type form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. Submit proposed diagrams, instructions, and other sheets prior to posting. Post the framed instructions before field training.

#### 1.6.9. (Reserved. See 1.7 for Field Training)

#### 1.6.10. System/Equipment Requirements

##### 1.6.10.1. Facility Heating System

Provide information on the following equipment: boilers, water treatment, chemical feed pumps and tanks, converters, heat exchangers, pumps, unit heaters, fin-tube radiation, air handling units (both heating only and heating and cooling), and valves (associated with heating systems).

##### 1.6.10.2. Air-Conditioning Systems

Provide information in chillers, packaged air-conditioning equipment, towers, water treatment, chemical feed pumps and tanks, air-cooled condensers, pumps, compressors, air handling units, and valves (associated with air-conditioning systems).

##### 1.6.10.3. Temperature Control and HVAC Distribution Systems

Provide all information described for the following equipment: valves, fans, air handling units, pumps, boilers, converters and heat exchangers, chillers, water cooled condensers, cooling towers, and fin-tube radiation, control air compressors, control components (sensors, controllers, adapters and actuators), and flow measuring equipment.

#### 1.6.10.4. Central Heating Plants

Provide the information described for the following equipment: boilers, converters, heat exchangers, pumps, fans, steam traps, pollution control equipment, chemical feed equipment, control systems, fuel handling equipment, de-aerators, tanks (flash, expansion, return waters, etc.), water softeners, and valves.

#### 1.6.10.5. Heating Distribution Systems

Provide the information described for the following equipment: valves, fans, pumps, converters and heat exchangers, steam traps, tanks (expansion, flash, etc.), and piping systems.

#### 1.6.10.6. Exterior Electrical Systems

Provide information on the following equipment: power transformers, relays, reclosers, breakers, and capacitor bank controls.

#### 1.6.10.7. Interior Electrical Systems

Provide information on the following equipment: relays, motor control centers, switchgear, solid state circuit breakers, motor controller, EPS lighting systems, wiring diagrams and troubleshooting flow chart on control systems, and special grounding systems.

#### 1.6.10.8. Energy Monitoring and Control Systems

The maintenance manual shall include descriptions of maintenance for all equipment, including inspection, periodic preventative maintenance, fault diagnosis, and repair or replacement of defective components.

#### 1.6.10.9. Domestic Water Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentation, laboratory test equipment, chemical feeders, valves, switching gear, and automatic controls.

#### 1.6.10.10. Wastewater Treatment Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentations, laboratory test equipment chemical feeders, valves, scrapers, skimmers, comminutors, blowers, switching gear, and automatic controls.

#### 1.6.10.11. Fire Protection Systems

Provide information on the following equipment: alarm valves, manual valves, regulators, foam and gas storage tanks, piping materials, sprinkler heads, nozzles, pumps, and pump drivers.

#### 1.6.10.12. Fire Alarm and Detection Systems

- (1) The maintenance manual shall include description of maintenance for all equipment, including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
- (2) Provide all software; database with complete identification of programmable portions of system equipment and devices, and all other system programming data on all modes of the system; connecting cables; and proprietary equipment necessary for the operation, maintenance, testing, repair and programming, etc. of the system and that may be required for implementation of future changes to the fire system (additional and/or relocated initiating devices, notification devices, etc.
- (3) Provide all system and equipment technical data and computer software with the requisite rights to Government use, in accordance with the applicable contract clauses.
- (4) Training shall include software and programming required for the effective operation, maintenance, testing, diagnostics and expansion of the system.

#### 1.6.10.13. Plumbing Systems

Provide information on the following equipment: water heaters, valves, pressure regulators backflow preventors, piping materials, and plumbing fixtures.

#### 1.6.10.14. Liquid Fuels Systems

Provide information on the following equipment: tanks, automatic valves manual valves, filter separators, pumps, mechanical loading arms, nozzles, meters, electronic controls, electrical switch gear, and fluidic controls.

#### 1.6.10.15. Cathodic Protection Systems

Provide information on the following material and equipment: rectifiers, meters, anodes, anode backfill, anode lead wire, insulation material and wire size, automatic controls (if any), rheostats, switches, fuses and circuit breakers, type and size of rectifying elements, type of oil in oil-immersed rectifiers, and rating of shunts.

#### 1.6.10.16. Generator Installations

Provide information on the following equipment: generator sets, automatic transfer panels, governors, exciters, regulators starting systems, switchgear, and protective devices.

#### 1.6.10.17. Miscellaneous Systems

Provide information on the following: communication and ADP systems, security and intrusion alarm, elevators, material handling, active solar, photovoltaic, nurse call, paging, intercom, closed circuit TV, irrigation, sound and material delivery systems, kitchen, refrigeration, disposal, ice making equipment, and other similar type special systems not otherwise specified.

#### 1.6.10.18. Laboratory, Environmental and Pollution Control Systems

Provide information on the following equipment: wet scrubbers, quench chambers, scrub tanks, liquid oil separators, and fume hoods.

### 1.7. FIELD TRAINING

Field Training is a requirement for substantial completion. Conduct a training course for the operating staff for each particular system. Conduct the training is to be conducted during hours of normal working time after the system is functionally complete. The field instructions shall cover all of the items contained in the Equipment Operating, Maintenance and Repair Manuals. The training will include both classroom and "hands-on" training. Submit a lesson plan outlining the information to be discussed during training periods. Submit this lesson plan for approval 90 days before contract completion before the field training occurs. Record training on DVD and furnish to the Government within ten (10) days following training. Document all training and furnish a list of all attendees.

### 1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY

Promptly furnish and require any sub-contractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and/or installed by the Contractor or sub-contractor, except prices do not need to be provided for Government-Furnished Property.

### 1.9. LEED REVIEW MEETINGS

1.9.1. Pre-Closeout Meeting. Approximately 30 days before submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the documentation, determine which, if any, credits will be audited and identify any corrections/missing items prior to the closeout LEED documentation submittal.

1.9.2. Approximately 14 days after submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the LEED closeout

documentation. The review conference will include discussion of and resolution of all review comments to ensure consensus on achievement of credits and satisfactory documentation. At the review conference a final score will be determined and endorsed in writing by all parties.

#### 1.10. RED ZONE MEETING

At approximately 80% of contract completion or 60 days before the anticipated Beneficial Occupancy Date (BOD), whichever occurs first, the Contractor and the Government's project delivery team will conduct what is known as the Red Zone Meeting to discuss the close-out process, to schedule the events and review responsibilities for actions necessary to produce a timely physical, as well as fiscal, project close-out. The Red Zone meeting derives its name from the football term used to describe the team effort to move the ball the last 20 yards into the end zone. The close-out of a construction project sometimes can be equally as hard and most definitely requires the whole team's efforts. The ACO will chair the meeting. If not already provided, shortly before the meeting, the Contractor shall provide an electronic copy or access to the CADD as-built drawings, completed commensurate with the amount of work completed at the time of the Red Zone Meeting, as an indicator of the Contractors' understanding of and ability to meet the USACE CADD Standards and to ensure that the Contractor is making progress with CADD As-Built requirements. EXHIBIT 1 is a generic meeting checklist.

#### 1.11. FINAL CLEANING

Clean the premises in accordance with FAR clause 52.236-12 and additional requirements stated here. Remove stains, foreign substances, and temporary labels from surfaces. Vacuum carpet and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean or replace filters of operating equipment if cleaning isn't possible or practicable. Remove debris from roofs, drainage systems, gutters, and downspouts. Sweep paved areas and rake clean landscaped areas. Remove waste, surplus materials, and rubbish from the site. Remove all temporary structures, barricades, project signs, fences and construction facilities. Submit a list of completed clean-up items on the day of final inspection.

#### 1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft provided with the final design package(s) (see Section 01 33 16, paragraph 3.7.5) and submit an accounting of all installed property on Interim Form DD1354 "Transfer and Acceptance of Military Real Property." Include any additional assets/improvements/alterations and cost updates from the Draft DD Form 1354. Contact the COR for any project specific information necessary to complete the DD Form 1354. This form will be a topic for the Red Zone Meeting discussed above. For information purposes, a blank DD Form 1354 (fill-able) in ADOBE (PDF) may be obtained at the following web site: <http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf> Submit the completed Checklist for Form DD1354 of Government-Furnished and Contractor-Furnished/Contractor Installed items. Attach this list to the updated DD Form 1354. Instructions for completing the form and a blank checklist (fill-able) in ADOBE (PDF) may be obtained at the following web site: [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1\\_300\\_08.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1_300_08.pdf)

## EXHIBIT 1

**SAMPLE**

## Red Zone Meeting Checklist

Date: \_\_\_\_\_

<b>Contract No.</b>			
<b>Description / Location</b>			
<b>Contractor</b>			
<b>Contracting Officer</b>			
<b>Action</b>	<b>Completion Milestone</b>	<b>√</b>	
Inspections			
Fire			
Safety			
Pre-final			
Mechanical Test & Balance			
Commissioning			
Landscaping Complete			
Erosion Control			
Beneficial Occupancy Date (BOD)			
Furniture Installation			
Comm Installation			
As-Built Drawings			
Provide all O&M manuals, tools, shop drawings, spare parts, etc. to customer			
Training of O&M Personnel			
Provide Warranty documents to Customer			
Contract completion			
Final Inspection			
User move-in			
DD Form 1354, Transfer of Real Property completed & signed			

Friday, April 29, 2011



Ribbon cutting		
Payroll Clearances		
DD Form 2626 - Construction Contractor Performance Evaluation		
DD Form 2631 – A-E Performance Rated after Construction		
Status of Pending Mods and REA's/Claims		
Final Payment Completed		
Release of Claims		
Return of Unobligated Funds		
Move Project from CIP to General Ledger		
Financial completion		

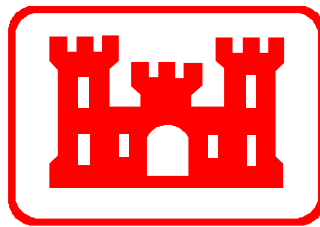
End of Section 01 78 02.00 10

## APPENDIX A

### Geotechnical Information

**FORT POLK, LOUISIANA**  
**UNIT OPERATIONS FACILITIES**  
**TACTICAL EQUIPMENT MAINTENANCE FACILITY (TEMF)**  
**&**  
**COMPANY OPERATIONS FACILITY (COF)**

**GOVERNMENT GEOTECHNICAL REPORT**  
**FOR DESIGN-BUILD PROJECT RFP**



**PREPARED BY**  
**U.S. ARMY CORPS OF ENGINEERS**  
**FORT WORTH DISTRICT**  
**ENGINEERING AND CONSTRUCTION DIVISION**  
**ENGINEERING BRANCH**  
**GEOTECHNICAL SECTION**  
**CESWF-EC-DG**

**JULY 2010**

Friday, April 29, 2011

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

**GOVERNMENT GEOTECHNICAL REPORT**

**1. General.** The purpose of this report is to provide subsurface information, and foundation and pavement design considerations, guidance, and requirements for new Unit Operations Facilities at Fort Polk, Louisiana. Design and construction of the new facilities will be accomplished under a design-build contract. The Unit Operations Facilities include a Tactical Equipment Maintenance Facility (TEMF) and a Company Operations Facility (COF). Preliminary project planning information available at the time of this report indicates the new Tactical Equipment Maintenance Facility will include an approximately 18,000 GSF Vehicle Maintenance Facility (Tactical Equipment Maintenance Facility) building (standard design, small), an approximately 480 GSF Hazardous Waste Storage Building, and an approximately 480 GSF Oil Storage Building (all square footage figures are approximate). The Company Operations Facility is anticipated to be approximately 15,000 GSF in size. There will also be a 2,800 GSF Unit Storage Building.

The Company Operations Facility is anticipated to incorporate two building sections – a single-story Administration Module and a split-level (tall single-story with partial second level mezzanine) Readiness Module. It is anticipated that all remaining project buildings will be single-story buildings. Specific details of the structural framing and roofing systems, exterior and interior finishing systems, and other construction details were not known at the time of this report. However, it is anticipated that the new building construction will match existing building architectural styles of the surrounding area. It is anticipated that the Vehicle Maintenance Facility (TEMF) building will include large vehicle repair bays and maintenance areas, as well as tool, equipment, and arms storage vaults, administrative areas, training and break rooms, restrooms, and electrical mechanical, and communication utility rooms. Rigid pavement features required for the project include an approximately 15,000 square yard organizational parking area (hardstand), access drives, aprons at vehicle and storage bays, and aprons in front of trash dumpster pads. Flexible pavement features include an approximately 22-vehicle capacity privately-owned vehicle

**FORT POLK, LOUISIANA**  
**UNIT OPERATIONS FACILITIES (TEMF & COF)**

(POV) parking area. The POV parking for the Company Operations Facility is anticipated to accommodate between 60 and 100 POVs. An aggregate-surfaced pavement section is provided for a gravel hardstand for Conex boxes. Support features for the project are anticipated to include utilities and landscaping.

The proposed Unit Operations Facility (TEMF and COF) project site is located on a semi-developed parcel in the southern part of the South Fort Polk cantonment area. Specifically, the project site is bounded to the north by Illinois Avenue and to the east by Texas Avenue. The southern boundary of the project site is located approximately 1,500 feet south of Illinois Avenue. The western boundary of the project site is located approximately at the mid-point between Georgia Avenue and Texas Avenue. Based on available topographic survey information, the Tactical Equipment Maintenance Facility site and the Company Operations Facility site have different existing site grading conditions. The Tactical Equipment Maintenance Facility site is significantly flatter than the Company Operations Facility site (located immediately to the south). The Tactical Equipment Maintenance Facility site slopes downgradient to the east and to the west from a high point (oriented northwest-southeast) situated in the middle to eastern quarter of the project site; gradients across the TEMF site range from approximately 1 to 3 percent. The Company Operations Facility site slopes downgradient to the southwest, with gradients across the COF site typically ranging from approximately 2 to 5 percent, although localized gradients may exceed 10 percent in the northwestern part of the site. Existing grades across the Tactical Equipment Maintenance Facility site range from approximately elevations 282.0 to 289.0 feet National Geodetic Vertical Datum (NGVD). Existing grades within the anticipated Vehicle Maintenance Facility (TEMF) building footprint range from approximately elevations 287.0 to 288.5 feet (NGVD). Existing grades across the Company Operations Facility site range from approximately elevations 269.0 to 288.0 feet (NGVD). Existing grades within the anticipated Company Operations Facility building footprint range from approximately elevations 274.0 to

**FORT POLK, LOUISIANA**  
**UNIT OPERATIONS FACILITIES (TEMF & COF)**

286.0 feet (NGVD). Demolition of existing site features prior to construction of the new project facilities is anticipated to include existing concrete pavement and an existing building slab in the area of the Tactical Equipment Maintenance Facility, and demolition of existing asphalt pavement in the area of the Company Operations Facility. It is anticipated that extensive fill placement (possibly exceeding 10 feet) will be required for construction of the Company Operations Facility. Finish floor elevations for the new facilities were not known at the time of this report.

**2. Subsurface Investigation.** Raba-Kistner Consultants, Inc., drilled twelve (12) test holes, 10A2S-TEMF-1 through 10A2S-TEMF-10 and 8A2S-TEMF-21 and 8A2S-TEMF-22, at the Tactical Equipment Maintenance Facility site, and ten (10) test holes, 10A2S-COF011 through 10A2S-COF-20, at the Company Operations Facility site in May 2010 under a contract geotechnical field investigation scope of work prepared by the U.S. Army Corps of Engineers, Fort Worth District. Raba-Kistner Consultants, Inc. accomplished the geotechnical field investigation with a Mobile B-59 truck-mounted drill rig using a nominal 3-inch diameter shelby tube sampler, a 4-inch diameter fish tail bit, and a nominal 2-inch diameter split-spoon sampler (which was also used to recover soil samples). The borings were advanced to total depths ranging from 11.5 feet to 61.5 feet below existing grade. Representative soil samples recovered from the borings were placed in containers and delivered to the laboratory of TEAM Consultants, Incorporated (Arlington, Texas) for testing. Results of the field investigation are presented on Sheet B101, Boring Locations, and on Sheets B201 through B204, Logs of Borings – TEMF Site and Sheets B205 through B207, Logs of Borings – COF Site (Appendix A).

a. **Groundwater Conditions.** Groundwater conditions were monitored during and upon completion of drilling operations, and after an observation period of up to 24 hours after completion of drilling operations. Based on the information reported on the logs of borings, groundwater was encountered in five of the twelve borings drilled at the Tactical Equipment Maintenance Facility site and in four of the ten borings drilled at the Company Operations Facility

**FORT POLK, LOUISIANA**  
**UNIT OPERATIONS FACILITIES (TEMF & COF)**

site. It should be noted that, based on previous engineering studies conducted at Fort Polk by the Fort Worth District, static groundwater levels of varying depths can be anticipated, ranging from depths at or within a few feet of the surface to greater than 25 feet below existing grade. It also should be noted that groundwater conditions are relative to the time of drilling, annual precipitation, and drainage conditions at the site. The successful bidder is advised to drill test holes prior to construction to verify groundwater conditions at the site, provide required design, and incorporate appropriate construction methods to properly account for groundwater. Tabulated below are the static levels measured at the time of the field investigation, by site area.

Tactical Equipment Maintenance Facility Site

<u>Boring</u>	<u>Static Level, feet</u>
8A2S-TEMF-4	18.6
8A2S-TEMF-6	18.2
8A2S-TEMF-7	19.5
8A2S-TEMF-21	17.8
8A2S-TEMF-22	20.2

Company Operations Facility Site

<u>Boring</u>	<u>Static Level, feet</u>
8A2S-COF-13	13.0
8A2S-COF-14	23.1
8A2S-COF-17	12.7
8A2S-COF-18	15.0

b. Dynamic Cone Penetrometer Testing. Dynamic Cone Penetrometer (DCP) testing for pavement design considerations was performed at the Tactical Equipment Maintenance Facility site in borings 10A2S-TEMF-1, 10A2S-TEMF-2, 10A2S-TEMF-3, 10A2S-TEMF-5, 10A2S-TEMF-6, 10A2S-TEMF-9, and 10A2S-TEMF-20. Dynamic Cone Penetrometer testing for pavement design considerations was performed at the Company Operations Facility site in borings 10A2S-COF-11, 10A2S-COF-12, 10A2S-COF-15, 10A2S-COF-16, 10A2S-COF-19, and 10A2S-

**FORT POLK, LOUISIANA**  
**UNIT OPERATIONS FACILITIES (TEMF & COF)**

COF-20. DCP test results are discussed later in this report, and will be presented as Appendix D of the final report.

c. Soil Resistivity Testing. One soil resistivity test was performed at the Tactical Equipment Maintenance Facility site at a location approximately 125 feet south of boring 8A2S-TEMF-6. A soil resistivity test also was performed at the Company Operations Facility site at a location approximately 20 feet east of boring 8A2S-COF-13. Soil resistivity test results are summarized below.

Tactical Equipment Maintenance Facility Site

<u>Diode Spacing, feet</u>	<u>Resistivity, ohm-cm</u>	
	<u>North-South</u>	<u>East-West</u>
2.5	6,687	5,873
5.0	7,872	7,084
7.5	8,579	8,346
10.0	9,163	9,405
15.0	10,861	11,007
20.0	12,570	11,946
30.0	14,541	12,266
40.0	14,255	13,236
50.0	13,214	13,606



**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

Company Operations Facility Site

<u>Diode Spacing, feet</u>	<u>Resistivity, ohm-cm</u>	
	<u>North-South</u>	<u>East-West</u>
2.5	11,155	12,400
5.0	16,277	17,618
7.5	21,831	22,836
10.0	25,086	26,618
15.0	28,438	29,874
20.0	32,555	31,406
30.0	32,746	32,172
40.0	30,640	30,640
50.0	26,810	29,682

**3. Subsurface Conditions.**

a. General Geology. Fort Polk lies within the West Gulf Coastal Plain section of the Coastal Plain physiographic province. The coastal plain of Louisiana is characterized by a broad rolling landform extending from the foot of the Ouachita Mountains on the north to the Gulf of Mexico on the south. It has developed upon a sequence of sedimentary rock units which dip gently southward, resulting in successively younger formations cropping out towards the Gulf. Most of Fort Polk lies within the outcrop area of the Fleming Formation, a complex sequence of sands and clays of Miocene age. Fisk (1940) divided the Fleming Formation into six members, distinguished from each other as being predominantly clayey zones or sandy zones. Although not accepted for use by the U.S. Geological Survey, the members are correlatable throughout several parishes on electric logs and show up as sandy intervals separated by clayey intervals. From oldest to youngest the members are: Lena, Carnahan Bayou, Dough Hills, Williamson Creek, Castor Creek, and Blounts Creek. The predominantly sandy members contain the aquifers that supply groundwater to Fort Polk.

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

Deposits of Pleistocene age continuously overlie the Fleming Formation within the extreme southeastern portion of Fort Polk. Elsewhere on the military reservation, these deposits form terraces that parallel the major streams and occur as isolated remnants mantling interstream highs. These deposits are fluvial in nature and are generally coarser grained than the underlying Miocene deposits.

Sediments of recent age are confined to alluvial deposits in the larger stream valleys and as a thin veneer of residual soils developed upon primary materials.

b. Site Conditions. Based on available topographic survey information, the Tactical Equipment Maintenance Facility site and the Company Operations Facility site have different existing site grading conditions. The Tactical Equipment Maintenance Facility site is significantly flatter than the Company Operations Facility site (located immediately to the south). The Tactical Equipment Maintenance Facility site slopes downgradient to the east and to the west from a high point (oriented northwest-southeast) situated in the middle to eastern quarter of the project site; gradients across the TEMF site range from approximately 1 to 3 percent. The Company Operations Facility site slopes downgradient to the southwest, with gradients across the COF site typically ranging from approximately 2 to 5 percent, although localized gradients may exceed 10 percent in the northwestern part of the site. Existing grades across the Tactical Equipment Maintenance Facility site range from approximately elevations 282.0 to 289.0 feet National Geodetic Vertical Datum (NGVD). Existing grades within the anticipated Vehicle Maintenance Facility (TEMF) building footprint range from approximately elevations 287.0 to 288.5 feet (NGVD). Existing grades across the Company Operations Facility site range from approximately elevations 269.0 to 288.0 feet (NGVD). Existing grades within the anticipated Company Operations Facility building footprint range from approximately elevations 274.0 to 286.0 feet (NGVD). It is anticipated that extensive fill placement (possibly exceeding 10 feet) will be required for construction of the Company Operations Facility.

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

Stratigraphically, the site is characterized by interbedded deposits of low to high plasticity clay (CL to CH, respectively), clayey sand (SC), silty sand (SM), poorly graded sand (SP), and poorly graded sand with silt (SP-SM). The low to high plasticity clay soils are soft to firm, moist to wet, gray to yellow brown to brown to red brown, sandy, and silty, with occasional scattered fine gravel and iron oxide stains noted. The sandy soils are typically loose to medium dense, moist to wet, gray to brown to yellow brown to red brown, clayey, and silty. Atterberg limits test results for the clayey soils at the Tactical Equipment Maintenance Facility site indicate these materials have liquid limits ranging from 26 to 114 percent, plastic limits varying from 12 to 36 percent (with plasticity indices ranging from 10 to 78 percent), and in situ moisture contents varying from approximately 11 to 43 percent. Atterberg limits test results for the clayey soils at the Company Operations Facility site indicate these materials have liquid limits ranging from 27 to 64 percent, plastic limits varying from 17 to 20 percent (with plasticity indices ranging from 8 to 44 percent), and in situ moisture contents varying from approximately 13 to 19 percent. It should be noted that soil specimens classifying as silty sands (SM) and subjected to Atterberg limits testing were determined to be non-plastic. Based on information presented on the logs of borings, possible fill materials were identified at the boring locations to depths ranging from 0.5 feet to 10 feet below existing grade.

Subsurface conditions representative of the project site are shown on the boring logs, Sheets B201 through B204, Logs of Borings – TEMF Site and Sheets B205 through B207, Logs of Borings – COF Site (Appendix A). The legend on the individual boring logs shows overburden materials as classified in the laboratory using procedures presented in ASTM D 2488. It should be noted that the actual interface between material types may be far more gradual or abrupt than represented; therefore, actual subsurface conditions in areas not sampled may differ from those predicted. The nature and extent of variations across the site may not become evident until construction commences, and the actual construction process may alter subsurface conditions as

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

well. If variations become evident at the time of construction, CESWF-EC-DG should be contacted to determine if the recommendations presented in this report need to be reevaluated.

**4. Testing.**

a. Laboratory Testing. Representative soil samples recovered from the borings were subjected to laboratory testing for identification, moisture content, grain-size distribution, Atterberg limits, density, strength, and controlled expansion-consolidation. The accumulative test results are presented in Appendix C. Results of identification testing are shown on the individual boring logs, Sheets B201 through B204, Logs of Borings – TEMF Site and Sheets B205 through B207, Logs of Borings – COF Site (Appendix A). The visual descriptions and Unified Soil Classifications presented on the logs are based on test methods presented in ASTM D 2488. Descriptions of overburden materials were changed to correspond with the laboratory classification.

The laboratory test results are also presented graphically, by respective project site, in Appendix B as follows: Plasticity characteristics are shown on Plate 1, Plasticity Chart. Moisture content values are shown with respect to depth on Plate 2. Atterberg limits test results are shown with respect to depth on Plate 3. Dry density values of representative undisturbed samples and their corresponding moisture contents are shown with respect to depth on Plate 4. Ultimate compressive strengths of the clayey soils are shown with respect to depth on Plate 5. Testing results for the Tactical Equipment Maintenance Facility site are denoted with an “a” suffix after the plate number (e.g., Plate 1a), while testing results for the Company Operations Facility site are denoted with a “b” suffix after the plate number (e.g., Plate 1b).

(1) Shear Strength Testing. Shear strength characteristics of the cohesive soils were analyzed in the laboratory using one-point unconsolidated-undrained triaxial compression testing, confining the specimens to overburden pressure and then loading to failure. The ultimate compressive strengths recorded are presented below and in Appendix C at the end of this report.

**FORT POLK, LOUISIANA**  
**UNIT OPERATIONS FACILITIES (TEMF & COF)**

Tactical Equipment Maintenance Facility Site

<u>Boring</u>	<u>Depth, ft</u>	<u><math>\gamma_d</math>, pcf</u>	<u><math>Q_u</math>, tsf</u>	<u>Material Type</u>
8A2S-TEMF-4	3.5	99.5	1.380	SM Silty Sand Overburden
8A2S-TEMF-4	8.5	105.2	2.090	CL Clay Overburden
8A2S-TEMF-4	53.5	78.1	1.910	CH Clay Overburden
8A2S-TEMF-4	58.5	99.0	6.260	SM Silty Sand Overburden

Company Operations Facility Site

<u>Boring</u>	<u>Depth, ft</u>	<u><math>\gamma_d</math>, pcf</u>	<u><math>Q_u</math>, tsf</u>	<u>Material Type</u>
8A2S-COF-18	3.5	105.6	2.120	CH Clay Overburden

(2) Controlled Expansion-Consolidation Testing. Controlled expansion-consolidation (CEC) testing was performed on one specimen of low plasticity clay (CL) collected at the Tactical Equipment Maintenance Facility site and on one specimen of high plasticity clay (CH) collected at the Company Operations Facility site to determine the shrink-swell potential of these materials. The low plasticity clay (CL) specimen subjected to CEC testing was collected at a depth of 8.5 feet within boring 8A2S-TEMF-4. This specimen has a liquid limit of 34 percent, a plastic limit of 16 percent ( $PI = 18$  percent), and a natural moisture content of approximately 14 percent. An expansion pressure ( $p_{exp}$ ) of approximately 0.5 tsf was recorded during CEC testing on this clayey sand specimen. Based on CEC test results, the low plasticity clay specimen collected at a depth of 8.5 feet within boring 8A2S-TEMF-4 has a low to moderate expansion potential ( $C_s = 0.019$ ;  $p_{exp}/p_0 = 1.0$ ) and a moderate potential for consolidation ( $C_c = 0.159$ ). Controlled expansion-consolidation testing also was performed on a specimen of high plasticity clay (CH) collected at a depth of 3.5 feet within boring 8A2S-COF-18. This high plasticity clay specimen has a liquid limit of 53 percent, a plastic limit of 20 percent ( $PI = 33$  percent), and a natural moisture content of approximately 19 percent. An expansion pressure ( $p_{exp}$ ) of approximately 0.5 tsf was recorded during CEC testing on this high plasticity clay specimen.

**FORT POLK, LOUISIANA**  
**UNIT OPERATIONS FACILITIES (TEMF & COF)**

Based on CEC test results, the high plasticity clay specimen collected at a depth of 3.5 feet within boring 8A2S-COF-18 has a moderate to high expansion potential ( $C_s = 0.017$ ;  $p_{exp}/p_0 = 2.3$ ) and a moderate potential for consolidation ( $C_c = 0.159$ ). CEC test results are summarized below and are included in Appendix C at the end of this report.

<u>Boring</u>	<u>Depth, feet</u>	<u>LL</u>	<u>&amp; PI</u>	<u>P<sub>exp</sub>, tsf</u>	<u>P<sub>exp</sub>/P<sub>0</sub></u>	<u>C<sub>s</sub></u>	<u>&amp; C<sub>c</sub></u>	<u>Material Type</u>
8A2S-TEMF-4	8.5	34	18	0.5	1.0	0.019	0.159	CL Clay Overburden
8A2S-COF-18	3.5	53	33	0.5	2.3	0.017	0.159	CH Clay Overburden

b. Field Testing.

(1) Standard Penetration Testing. Standard penetration testing (SPT) was performed in every boring at approximately 2.5-foot intervals for foundation design considerations. A standard penetration test consists of driving a standard 1.5-inch (I.D.) diameter split-spoon sampler 18 inches into the soil using a 140-pound free-falling hammer dropped a distance of 30 inches. The number of blows required for each 6 inches of penetration is recorded. Penetration resistance (N) is defined as the sum of blows required to drive the second and third increments, or the final 12 inches. It should be noted that “refusal” is taken as a blow count of 50 or more per 6-inch increment. SPT results are presented in the ‘Remarks’ column of the individual logs (Appendix A). Also, standard penetration test blow counts (N-values) are shown with respect to depth on Plate 6 in Appendix B.

Standard penetration testing is performed to evaluate the relative densities of the in situ soils for foundation design considerations. The results are used to calculate the shear strength of the in situ soils and settlements relative to given load conditions. Based on standard penetration testing performed across the entire Unit Operations Facilities project area, the relative density of the in situ sandy, silty, gravelly, and clayey soils is similar at both the Tactical Equipment Maintenance Facility and Company Operations Facility sites is very similar and consistent with

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

depth. The relative density of the soils generally ranges from loose to medium dense throughout the entire depth investigated (61.5 feet), although the soils range from very loose to dense at the Tactical Equipment Maintenance Facility site (with average N-values ranging from 2 to 32). At the Company Operations Facility site, the soils range from very loose to dense (with average N-values ranging from 3 to 30). It should be noted that at both sites the N-values are most commonly less than 15.

(2) Dynamic Cone Penetrometer Testing. Dynamic Cone Penetrometer (DCP) testing for pavement design considerations was performed at the Tactical Equipment Maintenance Facility site in borings 10A2S-TEMF-1, 10A2S-TEMF-2, 10A2S-TEMF-3, 10A2S-TEMF-5, 10A2S-TEMF-6, 10A2S-TEMF-9, and 10A2S-TEMF-20. Dynamic Cone Penetrometer testing for pavement design considerations was performed at the Company Operations Facility site in borings 10A2S-COF-11, 10A2S-COF-12, 10A2S-COF-15, 10A2S-COF-16, 10A2S-COF-19, and 10A2S-COF-20. A DCP consists of a steel rod with a steel cone attached to one end and a sliding single-mass hammer. For this project, the DCP test was performed by driving the steel cone into the soil using a 17.6-pound sliding hammer dropped from a height of 22.6 inches (574 millimeters). The number of blows required for each 0.4 inch (10-mm) or greater of penetration was recorded as the “penetration per blow set”; therefore, the more penetration achieved per blow indicates that a “weaker” soil layer was encountered. Typically, penetration measurements are taken to a depth of 39.4 inches (1000 millimeters) or when refusal is achieved. Refusal is defined as the point at which the cone cannot penetrate the soil more than 0.4 inches (10 millimeters). Presented below are the average in situ strength parameters derived from the DCP tests, by project site area.

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

Tactical Equipment Maintenance Facility Site

<u>Depth, in</u>	<u>CBR, %</u>	<u>k, pci</u>
0 – 6	4 – 45	124 – 379
6 – 12	8 – 40	172 – 313
>12	3 – 36	104 – 331

Company Operations Facility Site

<u>Depth, in</u>	<u>CBR, %</u>	<u>k, pci</u>
0 – 6	3 – 18	93 – 251
6 – 12	5 – 20	137 – 269
>12	5 – 45	130 – 374

**5. Discussions.** The following discussions are provided in support of the foundation and pavement design recommendations and requirements made herein for the proposed Unit Operations Facilities – TEMF and COF projects and appurtenant pavement structures. It should be noted that the discussions presented herein are based on the results of the Government geotechnical field investigation and laboratory testing program conducted at the site, as described previously in this report, as well as engineering studies, and previous engineering experience with similar structures at Fort Polk. **The Design-Build Contractor's foundation and pavement designs are required to comply with and to meet or exceed the minimum foundation and pavement design requirements and recommendations presented herein.** The bidders for this design-build contract project may use the subsurface boring log and lab testing data presented herein as a basis to formulate his or her foundation and pavement designs for the purposes of developing a bid for the project Request for Proposal (RFP) solicitation. However, the successful Design-Build Contractor shall supplement the information provided herein by his or her own geotechnical field investigation and laboratory testing program for the purpose of supplementing and comparing with the data provided in this report, verification of the stratigraphic contacts within design building footprints, and to serve as a basis for the development of his or her final foundation and pavement



**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

designs. **Supplemental geotechnical field investigations conducted by the Design-Build Contractor shall be ONLY for the purpose of supplementing the data regarding the subsurface conditions provided by the Government geotechnical field investigation.** These supplemental efforts shall include conducting testing on soil specimens as described in Section 4 (Testing). A minimum of **four (4)** additional test holes **each** shall be drilled within the design building footprints for the Vehicle Maintenance Facility (Tactical Equipment Maintenance Facility) and the Company Operations Facility. A minimum of **two (2)** additional test holes **each** shall be drilled within areas of new pavement structure construction at the TEMF site and the COF site. Additional test holes for foundation design shall each be drilled to a minimum depth of 30 feet below existing grade, and additional test holes drilled for pavement design shall be drilled to a minimum depth of 10 feet below existing grade. Laboratory testing performed by the Design-Build Contractor (and/or their associates) is required to meet the following standards (at a minimum): Tests on disturbed specimens of overburden soils shall include classification (ASTM D 2488), moisture content (ASTM D 2216), grain size analysis (ASTM D 422), and Atterberg limits (ASTM D 4318). Undisturbed (shelby tube) specimens of the overburden soils shall also be collected; tests on undisturbed specimens of the overburden soil shall include the tests listed for disturbed specimens, as well as controlled expansion-consolidation testing (ASTM D 2435 and ASTM D 4546 (Method C)), density (Corps of Engineers Engineer Manual (EM) 1110-2-1906, Appendix II, Par. 4, Displacement Method), and strength testing (ASTM D 2850).

**Development of the final foundation and pavement designs is the responsibility of the Design-Build Contractor; however, the Design-Build Contractor's final foundation and pavement designs shall be in full compliance with the requirements prescribed herein (including foundation type, foundation design parameters, and minimum pavement sections and pavement design criteria and parameters).** The Design-Build Contractor shall provide to the Government engineering studies and design calculations that support the foundation and pavement design

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

recommendations they or their associates propose. The Design-Build Contractor's foundation and pavement design recommendations shall be reviewed for technical adequacy and compliance with the requirements and criteria established herein and in the Request for Proposal (RFP). Specific requirements for the Design-Build Contractor's foundation and pavement design analysis are provided in section 6.c.

a. Soil Activity Considerations. The Tactical Equipment Maintenance Facility and Company Operations Facility sites are characterized by interbedded deposits of low to high plasticity clay (CL to CH, respectively), clayey sand (SC), silty sand (SM), poorly graded sand (SP), and poorly graded sand with silt (SP-SM). Atterberg limits test results for the clayey soils at the Tactical Equipment Maintenance Facility site indicate these materials have liquid limits ranging from 26 to 114 percent, plastic limits varying from 12 to 36 percent (with plasticity indices ranging from 10 to 78 percent), and in situ moisture contents varying from approximately 11 to 43 percent. Atterberg limits test results for the clayey soils at the Company Operations Facility site indicate these materials have liquid limits ranging from 27 to 64 percent, plastic limits varying from 17 to 20 percent (with plasticity indices ranging from 8 to 44 percent), and in situ moisture contents varying from approximately 13 to 19 percent.

Based on the results of Atterberg limits, in situ moisture content testing, controlled expansion and consolidation testing, and engineering judgment and experience at Fort Polk, an active zone of at least 15.0 feet shall be used for expansive soils analyses. A deeper active zone shall be validated by additional borings. The results of Atterberg limits testing and CEC testing indicate that the clayey, sandy soils are potentially susceptible to both heave and consolidation. Once built upon, these materials can experience significant volumetric changes when their in situ moisture environment is altered. These volumetric change capacities necessitate special requirements with regard to the foundation design and earthwork activities for the new project construction, as are provided herein, to ensure adequate foundation performance.

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

b. Foundation Design Considerations. A variety of foundation systems have been utilized with success at Fort Polk, depending on site-specific subsurface conditions. Shallow foundation systems include spot and continuous spread footings, and reinforced concrete ribbed and flat mat slabs. Deep foundation systems include pre-cast reinforced concrete driven piles and reinforced concrete drilled and underreamed piers. Considerations associated with deep and shallow foundation systems are discussed in the following paragraphs.

A deep foundation system will not be necessary to support the anticipated building loads. Furthermore, the in situ soils exhibit no significant increase in strength with depth; hence there is no bearing capacity advantage of a deep foundation system of either driven piles or underreamed piers. The potentially high groundwater levels and sandy soils, prone to sloughing, based on experience, would also increase the difficulty in constructing a drilled and underreamed pier foundation system. Also, heave forces acting upon pier or pile foundations from the very high plasticity clays present at the site, and potentially large settlements that could be induced within clayey zones and seams by deep foundations could create significant structural distress within the facility. Lastly, it is anticipated that a shallow foundation system could be constructed more economically than a deep foundation system. Therefore, **a deep foundation system shall not be used for the buildings to be constructed within the scope of this project.**

Based on the results of laboratory strength testing and controlled expansion-consolidation testing, and engineering experience and judgment, the in situ clayey and sandy overburden soils identified during the geotechnical field investigation can be expected to be susceptible to both total and differential settlements from shallow foundation loads. Thus a shallow foundation will need to act monolithically to ensure differential movements do not exceed tolerable limits. The best foundation performance for this facility can be achieved by a reinforced concrete ribbed mat slab or flat mat slab. A properly designed and constructed ribbed mat or flat mat slab will act monolithically, would be anticipated to be constructed above the groundwater level, and also

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

would be assigned an allowable bearing capacity that would minimize the potential for excessive total or differential settlements to occur. **Therefore, the Design-Build Contractor shall limit consideration for foundation systems to either a reinforced concrete ribbed mat slab or a reinforced concrete flat mat slab.** The structural designer shall select the foundation system between these two types based on suitability for the structure, and, secondarily, on which foundation system would be able to provide the best performance for the greatest construction economy. A shallow spot and/or continuous spread footing foundation system shall not be allowed for this facility. **IT IS REQUIRED THAT ALL FOUNDATION, FLOOR SLAB, AND EARTHWORK DESIGNS AND CONSTRUCTION BY THE DESIGN-BUILD CONTRACTOR AND THEIR ASSOCIATES SHALL COMPLY WITH THE MINIMUM REQUIREMENTS PRESENTED HEREIN.**

c. Pavement Design Considerations. The pavement designs presented in this report are based on criteria contained in *UFC 3-250-01FA*, *UFC 3-250-18FA*, *UFC 3-320-06A*, and engineering judgment.

(1) Traffic Types and Conditions. Six (6) pavement structures were analyzed and for this project, with minimum designs presented herein. New rigid pavement includes an approximately 15,000 square yard organizational parking area (hardstand), access drives and service drives, aprons at vehicle and storage bays, and aprons in front of trash dumpster pads. New flexible pavement includes an approximately 22-vehicle capacity privately-owned vehicle (POV) parking area for the Tactical Equipment Maintenance Facility. The POV parking for the Company Operations Facility is anticipated to accommodate between 60 and 100 POVs. An aggregate-surfaced pavement section is provided for a gravel hardstand for Conex boxes. The initial user of these facilities is anticipated to be a medical unit. The principal vehicles to be serviced and maintained by the new facilities are anticipated to be HMMWV (High-Mobility Multipurpose Wheeled Vehicle) variants. Other vehicles anticipated to be operated at the site

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

include tractor trailer trucks (Category IVA Traffic) and fork lifts. It is anticipated that the hardstand and access drives may experience up to 250 passes per hour of Category IVA Traffic (for a Class E Street and a pavement Design Index of 5). It is anticipated that the aprons in front of vehicle and storage bays will experience up to 250 passes per hour of Category IVA Traffic (for a Class E Street and a Design Index of 5), and up to 10-kip axle-load forklift trucks making less than 250 passes per day (for a Design Index of 5, per *UFC 3-320-06A*). Aprons in front of trash dumpster pads are anticipated to experience infrequent passes of trash trucks (Category IVA Traffic, Class F Street, Design Index = 4). The types of vehicles to occupy the POV parking area are anticipated to be limited to passenger cars and trucks (Category II Traffic) making at least 25 but fewer than 250 passes per hour (for a Class E Street and a Design Index of 2). These traffic loading conditions reflect the anticipated requirements of the medical unit which shall initially utilize the facilities. However, it is standard design practice (and requirement) to ensure future mission adaptability of vehicle maintenance facilities. This necessitates designing vehicle maintenance facilities to accommodate the largest vehicles operated at the installation. Therefore, the pavement structures for all areas (with the exception of POV parking areas) are designed to accommodate 120-kip track-laying vehicles (M1 Abrams tanks) making up to 10 passes per day; this design (Design Index = 8) also accommodates equivalent loading of 90-kip track-laying vehicles making up to 100 passes per day. If final design traffic loading conditions exceed the conditions specified herein, notify CESWF-EC-DG which shall evaluate the traffic loading conditions and issue revised minimum pavement section(s), as warranted, to accommodate the design traffic loading conditions. Based on criteria contained in the aforementioned Technical Manuals, the following traffic conditions were assigned for the remaining pavement structures:

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

<u>Pavement Structure</u>	<u>Traffic Category</u>	<u>Street Class</u>	<u>Design Index</u>
<u>Rigid</u> Hardstand	Cat. VII Vehicles making $\leq 10$ passes/day		8
Access Drives	Cat. VII Vehicles making $\leq 10$ passes/day		8
Aprons, Vehicle & Storage Bays	Cat. VII Vehicles making $\leq 10$ passes/day		8
Apron (Trash) and Service Drives	IVA	F	4
<u>Flexible</u> POV Parking Areas	II	E	2

If vehicle traffic loads and frequency are determined to be greater than those assumed in this report, structural pavement sections shall be increased appropriately using PCASE design.

(2) Pavement Design Parameters. California Bearing Ratio (CBR) and plate bearing tests were not conducted for this project. Instead, dynamic cone penetrometer (DCP) testing was conducted to evaluate the raw subgrade for pavement design considerations. The penetration resistance obtained from the DCP test is a measure of the soil's relative density, which in turn is used to derive "in situ" CBR and modulus of subgrade reaction values.

The average in situ CBR values measured within the upper 12 inches of soils tested at the Tactical Equipment Maintenance Facility site range from approximately 4 to 45 percent, and below this depth, CBR values range from 3 to 36 percent. Modulus of subgrade reaction values measured within the upper 12 inches of soils tested at the Tactical Equipment Maintenance Facility site range from 124 to 379 pci, and below this depth, modulus of subgrade reaction values range from 104 to 331 pci. The average in situ CBR values measured within the upper 12 inches of soils tested at the Company Operations Facility site range from approximately 3 to 20 percent, and below this depth, CBR values range from 5 to 45 percent. Modulus of subgrade reaction values measured within the upper 12 inches of soils tested at the Company Operations Facility site range from 93 to 269 pci, and below this depth, modulus of subgrade reaction values range from 130 to 374 pci. Laboratory CBR tests previously have been performed on similar subgrade materials collected at Fort Polk. The results indicate that CBR values between 3 and 4 percent can be expected for the sandy and clayey subgrade when compacted to 90 percent of maximum laboratory density. Previously conducted plate-bearing tests indicate the modulus of subgrade reaction for

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

this material to range from 100 pci to 150 pci. Based on the results of DCP testing and experience and engineering judgment, and in anticipation that some pavement structures may be constructed on fill materials, design CBR and modulus of subgrade reaction values of 4 percent and 100 pci, respectively, were assigned to the raw subgrade when compacted to 90 percent of laboratory maximum density (ASTM D 1557). To ensure that these design CBR and modulus of subgrade reaction values are achieved, the upper 6 inches of raw subgrade materials directly underlying the base course layer(s), as specified herein, shall consist of satisfactory materials, *excluding* materials that classify as CH materials. If the upper 6 inches of raw subgrade directly underlying the base course layer(s) are CH materials, the upper 6 inches of these materials shall be removed and replaced with satisfactory materials (excluding CH materials), and compacted to the density specified for raw subgrade underlying pavements. The CBR value considered for the sand clay gravel base material is 50.

**6. Recommendations and Requirements.** The following foundation and pavement design recommendations and requirements are based on the results of the field investigation, laboratory testing, engineering studies, and the criteria cited herein.

a. Foundation Design Recommendations and Requirements.

(1) Foundation System. Only the following foundation systems shall be allowed for the buildings to be constructed for the facilities included in the Tactical Equipment Maintenance Facility and Company Operations Facility projects: 1) a reinforced concrete ribbed mat slab, or 2) a reinforced concrete flat mat slab, designed in accordance with the criteria and requirements specified herein. **NO OTHER FOUNDATION SYSTEMS SHALL BE**

**ALLOWED. THE FOLLOWING FOUNDATION SYSTEMS ARE SPECIFICALLY PROHIBITED: SPOT AND/OR CONTINUOUS SPREAD FOOTINGS, DRILLED PIERS (BOTH STRAIGHT-SHAFT AND UNDERREAMED), DRIVEN OR CAST-IN-PLACE PILES, AND AUGER CAST PILES.** Criteria for Site Class D shall be utilized for foundation seismic

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

design purposes, as presented in *UFC 3-310-04 – Seismic Design for Buildings*. The Design-Build Contractor is responsible for developing the final foundation designs and earthwork requirements. The Design-Build Contractor shall use the subsurface conditions and laboratory and in situ testing data provided in this report, as well as supplemental subsurface investigations and testing performed by them or their associates to develop the final foundation designs and earthwork requirements. The Design-Build Contractor also shall use the design criteria cited herein to develop the final foundation designs and earthwork requirements. However, **it is required that the Design-Build Contractor's final foundation designs and earthwork requirements meet (or exceed) the minimum foundation design and earthwork requirements specified herein.**

(a) Reinforced Concrete Ribbed Mat or Flat Mat Slab. The proposed buildings to be constructed for the Tactical Equipment Maintenance Facility and Company Operations Facility projects shall be supported on either a reinforced concrete ribbed mat slab or a flat mat slab foundation system. **The mat slabs shall be conventionally reinforced – POST-TENSIONED SLABS ARE NOT ALLOWED.** A ribbed mat slab consists of a grid of stiffening ribs cast monolithically with the floor slab. The monolithic nature of this system allows the foundation to span or cantilever areas where a loss of support may occur; thus potential differential settlements are spread over a large horizontal area by the ribs through soil-structure interaction. The mat slabs shall be analyzed and designed for a minimum of 1.0 inch of long-term differential movement. For this reason, interior ribs shall be spaced no further than 15 feet center-to-center, and diagonal stiffener ribs should be placed at each corner of the mat slab. Design of the ribbed mat slab shall meet the minimum requirements as presented in *CESWD-ED-TS/G Criteria Letter, dated 29 January 1988 – Design Criteria for Ribbed Mat Foundations*, *SWDED-G Criteria Letter, dated 16 April 1987 – Criteria for Developing Geotechnical Design Parameters for SWD Ribbed Mat Design Methodology*, and the recommendations and requirements provided



**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

herein.

Interior and exterior beams shall bottom a minimum of 24 inches below outside finished grade. An allowable bearing capacity of 2.0 ksf (net) shall be used to size the beams. For this phase of design, it should be noted that (1) the structural load is supported solely on the beam and the beam intersections, (2) load transfer occurs over the effective beam width, and (3) the beam and soil remain in contact. Beam intersections should be widened at column locations to accommodate the above allowable bearing value for the anticipated load condition. The load used to size the beams shall consist of full dead load plus that portion of the live load that acts more or less continuously, usually 50 percent.

The ribbed mat slab foundations shall incorporate adequate stiffness such that the deformations do not exceed the structural tolerance of any elements in the foundation or superstructure. At a minimum, analyses should consider a vertical separation of the foundation slab and beams from the subgrade of 1.0 inch at the outside of all perimeter beams, with loss of support beneath the foundation over a horizontal distance of not less than 4.5 feet. This loss of support condition corresponds to the **center lift mode**. Additionally, **edge lift analyses** should consider an edge moisture variation distance equal to 5.25 feet, and an edge lift heave of 1.0 inch should be used in the design of the ribbed mat slab. This edge lift heave corresponds to an applied structural pressure of 100 psf. For edge lift considerations, two additional combinations of pressure and swell are required. For an allowable bearing capacity of 2.0 ksf, an edge lift heave of 0.75-inch can be expected to occur. At an ultimate bearing capacity of 6.0 ksf, 0.5-inch of heave should be anticipated. It should be noted that these anticipated heave amounts are based on the upper 4.5 feet (minimum) of existing soils within the proposed building footprints being removed and replaced with compacted nonexpansive backfill, as required herein. Should greater deflections be determined by additional testing done by the contractor, additional stiffness shall be designed into the foundation above these minimums.

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

A modulus of subgrade reaction equal to 200 psi/inch should be used when analyzing the ribbed mat slabs to determine in-service deformations. This value, however, should be factored to account for width effects such that  $k_{\text{design}} = k_1(B_{\text{eff}})$ , where  $B_{\text{eff}}$  is the effective beam width in feet. Design of the ribbed mat slabs may use the *SWD-AEIM* sections as a minimum stiffness "first approximation".

A reinforced concrete flat mat foundation should have a uniform thickness of not less than 2.0 feet. The mat should be tapered as required to ensure the perimeter of the slab extends to a constant elevation and is at least 24 inches below outside finish grade. An allowable bearing pressure of 2.0 ksf (net) shall be used to design the flat mat slabs. The load used to size flat mat slabs should consist of the full dead load plus that portion of the live load that reacts continuously, usually 50 percent. Flat mat slabs also should incorporate adequate stiffness such that the deformations do not exceed the structural tolerances of any element of the foundations or superstructures. Flat mat slabs should be analyzed for stiffness using the same edge and center lift mode analysis parameters as provided in this report for ribbed mat slab foundations and likewise stiffened if additional tests and analyses indicate greater deflections are possible.

The mat slabs will, by design, be supported on-grade. A polyethylene vapor barrier (10-mil minimum thickness) and a minimum 6-inch capillary water barrier should be placed beneath the mat slab.

(b) Small Support-type Structures. Small support-type structures (<500 GSF), if used, can be supported on reinforced concrete slabs-on-grade with turned-down edge beams. The turned-down edge beam should extend a minimum of 12 inches below outside finished grade and can be sized for a safe bearing pressure of 2,000 psf (net). Subgrade preparation shall be in accordance with the requirements specified below for ribbed and flat mat slabs.

(2) Subgrade Preparation Requirements. For ribbed mat and flat mat slab foundations, the upper 4.5 feet (minimum) of existing soils within the proposed building footprints

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

shall be removed and replaced with compacted nonexpansive backfill, which should limit the magnitude of predicted movement to approximately 1 inch or less. Furthermore, **subgrade preparation for the mat slabs (both ribbed mat and flat mat) shall ensure that a minimum of 2.5 feet of existing soil below the base of these features shall be removed and replaced with compacted nonexpansive fill, regardless of the amount of cut or fill required for site grading.**

Any additional fill required to reach the final subgrade elevation below the base of the mat ribs or mat slab should be nonexpansive material as well. These measures should limit the magnitude of predicted floor slab movement to approximately 1 inch or less. Should further tests and analysis by the contractor show greater soil replacement is needed, then those stricter depths shall be incorporated. Nonexpansive fill should be placed in controlled lifts not exceeding 8 inches in loose thickness and compacted to not less than 95 percent of maximum laboratory density as determined in accordance with ASTM D 1557. The upper 6 inches of existing subgrade exposed after excavation operations, or cleared prior to fill placement should be scarified, moistened, manipulated, and recompact to the same density required for nonexpansive fill materials. Vibration compaction should not be allowed. Groundwater levels, if present during construction, should be controlled in cut sections of the site by appropriate ditch construction and pumping to achieve required compaction levels of in place soils and fills.

(3) **Below-Grade Structures.** The following information is provided for the design of all below-grade structures, if applicable. An at-rest lateral earth pressure coefficient ( $k_o$ ) of 0.7, an angle of internal friction ( $\phi$ ) of  $28^\circ$ , and a cohesion value ( $c$ ) of 100 psf shall be used. The backfill material should be assumed to have a moist unit weight of 125 pcf and all backfill should be nonexpansive or select material. An active earth pressure coefficient ( $k_a$ ) and a passive earth pressure coefficient ( $k_p$ ) of 0.36 and 2.77, respectively, can be used for excavations for below-grade structures.

(4) **Drainage.** Proper drainage is an important design consideration to ensure

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

satisfactory long-term foundation performance. Exterior grading adjacent to the completed buildings should be sloped away from the structures a minimum of 5 percent for the first 10 feet. Runoff from the roofs should be adequately discharged a sufficient distance away from foundation edges. In no case shall water be allowed to pond adjacent to or beneath the buildings, both during and after construction.

(5) Care of Water. Drainage of ground and surface water from the project site continually throughout the construction contract is essential. The contractor will be required to protect the excavation and all constructed work throughout the life of the contract by means of ditches, berms, sumps with pumps, and any other means required to continually and effectively remove water from the site at all times. Ponding of water in the excavation is unacceptable at any time. These requirements shall be reflected in the specifications and structural notes.

(6) Mechanical Connections. All exterior mechanical connections shall be of the flexible type. Flexible connections should be capable of resisting a minimum of 2 inches of both vertical and horizontal movement. All condensate lines should drain away from foundation edges.

(7) Backfill Adjacent to Exterior Grade Beam Excavation. Use select clay backfill adjacent to exterior grade beam excavation to minimize water penetration to expansive subsoils.

(8) Material Testing Requirements. Testing shall be the responsibility of the contractor to ensure that the subgrade, fill, and backfill materials are properly compacted. To this end, the following frequencies of testing shall be included in the contract as a minimum:

- In-place density of the subgrade, fills, and backfills shall be performed for every 2000 square feet per lift in accordance with ASTM D 1556 or ASTM D 2922.
- Optimum Moisture and Laboratory Maximum Density of nonexpansive fill and backfill shall be performed for every 500 cubic yards or when any change in material occurs.

(9) Foundation Material Definitions.

(a) Satisfactory Materials. Satisfactory materials include materials

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

classified in ASTM D 2487 as GW, GM, GC, GP, SW, SP, SM, SC, CL, and CH and shall be free of trash, debris, roots or other organic matter, or stones larger than 3 inches in any dimension.

(b) Unsatisfactory Materials. Unsatisfactory materials include materials classified in ASTM D 2487 as Pt, OH, OL, ML, MH and any other materials not defined as satisfactory.

(c) Nonexpansive Soils. Nonexpansive soils for nonexpansive fill shall meet the requirements of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Sand Clay Gravel", Part X, Section 1003.03(a). Satisfactory soils with a plasticity index of not less than 4 nor greater than 12 percent may be used as Nonexpansive soils.

(d) Select Soils. Select soils shall include all Satisfactory soils except CH materials. Select soils shall have a maximum liquid limit of 35 percent and a plasticity index of not less than 12 nor greater than 20 percent.

(e) Select Clay Backfill. Select clay backfill shall be a satisfactory material having a liquid limit of 35 percent or less, and a plasticity index of not less than 8 nor greater than 20 when tested in accordance with ASTM D 4318, and classifying as a CL in accordance with ASTM D 2487.

(f) Capillary Water Barrier. Capillary Water Barrier shall consist of clean, crushed, nonporous rock, crushed gravel, or uncrushed gravel. The maximum particle size shall be 1.5 inches and no more than 2 percent by weight shall pass the No. 4 sieve.

(g) Cohesionless and Cohesive Materials. Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

(h) Degree of Compaction. Degree of compaction is a percentage of the

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

maximum density obtained by the test procedure presented in ASTM D 1557.

The above material definitions and subgrade preparation requirements should be presented in *UFGS-31 00 00 EARTHWORK*.

b. Pavement Design Recommendations and Requirements. The minimum pavement sections presented below are based on criteria contained in *UFC 3-250-01FA*, *UFC 3-250-18FA*, *UFC 3-320-06A*, and engineering judgment. The Design-Build Contractor is responsible for developing the final pavement designs. The Design-Build Contractor shall use the subsurface conditions and laboratory and in situ testing data provided in this report, as well as any supplemental subsurface investigations and testing performed by them or their associates, and any supplemental information regarding traffic loading conditions and requirements (beyond that provided herein) to develop the final pavement designs. The Design-Build Contractor shall use the United Facilities Criteria (UFCs) cited herein as well as Pavement-Transportation Computer Assisted Structural Engineering (PCASE) software (available at <https://transportation.wes.army.mil/triservice/pcase/> as a free download) to develop the final pavement designs. However, **it is required that the Design-Build Contractor's final pavement sections meet (or exceed) the minimum pavement sections specified herein.**

(1) Rigid Pavement. The following minimum rigid pavement sections shall be used for the hardstand, access and service drives, aprons at vehicle bays and storage bays, and aprons for a minimum distance of 15 feet in front of trash dumpster pads. The rigid pavement designs consider a modulus of subgrade reaction of 100 pci for the raw subgrade when compacted to 90 percent of laboratory maximum density and a concrete flexural strength of 600 psi at 28 days.

(a) Hardstand and Access Drives. The design is based on Category VII Traffic making up to 10 passes per day (Design Index = 8). This minimum pavement section shall be used for all hardstand and access drive areas for the TEMF. For access and service drives around the COF, the minimum section provided in Paragraph 6.b.(1)(c) shall be used.

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

9" Portland Cement Concrete (nonreinforced)

6" Open Graded Asphalt Stabilized Drainage Layer

4" Separation Layer (CBR=50) compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(b) Aprons at Vehicle and Storage Bays. The design considers Category VII

Traffic making up to 10 passes per day (Design Index = 8).

7.5" Portland Cement Concrete reinforced with No. 4 bars spaced 16" o.c.e.w.

6" Open Graded Asphalt Stabilized Drainage Layer

4" Separation Layer (CBR=50) compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

(c) Service Drives – Areas Limited to Category IVA Traffic. The design is based on Category IVA Traffic and a Class F Street (Design Index = 4). This pavement section shall not be used around the TEMF; this section only applies to service and access drives for the COF.

7.5" Portland Cement Concrete (nonreinforced)

6" Open Graded Asphalt Stabilized Drainage Layer

4" Separation Layer (CBR=50) compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(d) Aprons in Front of Trash Dumpster Pads. The design is based on Category IVA Traffic and a Class F Street (Design Index = 4).

6" Portland Cement Concrete reinforced with No. 4 bars spaced 16 inches o.c.e.w.

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(e) Floor Slab within Vehicle and Storage Bays.

Vehicle Bays. The design considers Category VII Traffic making up to 10 passes per day (Design Index = 8), an effective modulus of subgrade reaction equal to 200 pci (upgraded due to nonexpansive fill), and a concrete flexural strength of 600 psi at 28 days. The vehicular floor slab shall have a minimum thickness of 7.0 inches and shall be reinforced with No. 4 bars spaced 12 inches on-center and in each direction. Subgrade preparation below the vehicle bay floor slabs shall be in compliance with the requirements specified in this report for floor slabs placed on-grade.

Storage Bays. For storage bays that will not experience greater than Category IVA Traffic, the following minimum pavement section shall be used. The design considers Category IVA Traffic making less than 250 passes per hour (Class E Street, with upgraded Design Index = 6), and up to 10-kip axle-load forklift trucks making less than 250 passes per day (upgraded Design Index = 6, per *UFC 3-320-06A*), an effective modulus of subgrade reaction equal to 200 pci (upgraded due to nonexpansive fill), and a concrete flexural strength of



**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

650 psi at 28 days. The storage bay floor slab shall have a minimum thickness of 6.5 inches and shall be reinforced with No. 4 bars spaced 12 inches on-center and in each direction. Subgrade preparation below the storage bay floor slabs shall be in compliance with the requirements specified in this report for floor slabs placed on-grade.

Reinforcement for odd-shaped slabs, joint design, joint spacing, and other details should be in accordance with *UFC 3-250-01FA*, where applicable. The reinforcement bars should be placed a minimum of 1.5 inches clear distance from the surface of the pavement.

(2) Flexible Pavement. The following minimum flexible pavement section shall be used for the privately-owned vehicle (POV) parking area(s). The flexible pavement designs consider a CBR value of 4 percent for the raw subgrade when compacted to 90 percent of laboratory maximum density.

(a) POV Parking Area(s). The design is based on Category II Traffic and a Class E Street (Design Index = 2).

1.5" Hot-Mix Surface Course

7" Base Course (CBR=50) compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(3) Aggregate-Surfaced Pavements. The following pavement section is required for gravel hardstands for Conex boxes. The aggregate-surfaced pavement designs consider a CBR value of 4 percent for the raw subgrade when compacted to 90 percent of laboratory maximum density.

(a) Gravel Hardstands for Conex Boxes

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

6" Aggregate-Surface Course compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

The following note should be incorporated as part of the pavement details shown on the contract drawings.

*1. "The moisture content shall be at least 1 percent above optimum during compaction of the raw subgrade."*

*2. "The upper 6 inches of raw subgrade materials directly underlying the base course layer(s) shall consist of satisfactory materials, excluding materials that classify as CH materials. If the upper 6 inches of raw subgrade directly underlying the base course layer(s) are CH materials, the upper 6 inches of these materials shall be removed and replaced with satisfactory materials (excluding CH materials), and compacted to the density specified for raw subgrade underlying pavements."*

(4) Pavement Material Definitions.

(a) High Stability Hot-Mix Surface Course. Aggregates and asphaltic materials shall conform to the requirements of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Asphaltic Concrete Mixtures", Part V. Asphaltic material for the paving mixture should be asphaltic cement, viscosity grade AC-30 or PG-64-22. Edit guide specification ***UFGS-32 12 16 HOT-MIX ASPHALT (HMA) FOR ROADS*** to the above requirements.

(b) Prime Coat and Tack Coat. Asphaltic material for the prime coat shall be cut-back asphalt, grade MC-30, conforming to the requirements of Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Asphaltic Materials", Part X, Section 1002. Prime coat should be applied to the surface of the base course.

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

Asphaltic material for the tack coat shall be cut-back asphalt, grade RC-250, or emulsified asphalt, grade SS-1, conforming to the requirements of Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Asphaltic Materials", Part X, Section 1002. Tack coat should be applied to all surfaces that contact new asphalt pavement. Edit guide specification ***UFGS-32 12 10 BITUMINOUS TACK AND PRIME COATS*** to the above requirements.

(c) Portland Cement Concrete. The material shall conform to the requirements of ***UFGS-32 13 14 CONCRETE PAVEMENTS FOR SMALL PROJECTS***. The maximum nominal size coarse aggregate shall be 1.5 inches, and the mixture shall be designed to attain a flexural strength of 600 psi at 28 days.

(d) Base Course. Aggregates shall conform to the requirements of ***UFGS-32 11 23 AGGREGATE BASE COURSE***, and shall have a CBR value of 50 percent. The gradation for the material should conform to the requirements of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Sand Clay Gravel", Part X, Section 1003.03(a).

(e) Raw Subgrade. The material shall conform to the requirements of satisfactory soils as defined herein, with the exception of CH soils. If the upper 6 inches of raw subgrade directly underlying the base course layer(s) are CH materials, the upper 6 inches of these materials shall be removed and replaced with satisfactory materials (excluding CH materials), and compacted to the density specified for raw subgrade underlying pavements.

(f) Rapid Drainage Material. The material shall conform to the requirements of ***UFGS-32 11 10 DRAINAGE LAYER***.

(g) Separation Layer. A separation layer is a layer provided directly beneath the drainage layer to prevent fines from infiltrating or pumping into the drainage layer and to provide a working platform for construction and compaction of the drainage layer. For a

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

separation layer composed of graded aggregate material, as indicated in the pavement sections, above, the material shall conform to the requirements of a 50 CBR subbase (Gradation 1) as prescribed by guide specification *UFGS-32 11 16*.

(5) Vehicular Pavement Material Testing Requirements. Testing shall be the responsibility of the contractor to ensure that the subgrade, base course, hot-mix surface course, and Portland cement concrete are properly constructed. To this end, the following testing requirements shall be included in the contract specifications as a minimum:

- In-place density testing of the subgrade, aggregate surface course, and base course shall be performed, at a minimum, every 600 square yards per lift in accordance with ASTM D 1556 and ASTM D 2922. ASTM D 1556 shall be used as a check at least once per lift for each 3,000 square yards of completed subgrade, aggregate surface course, and base course.
- Before starting work, at least one sample of base course, aggregate surface course, and base course material shall be tested in accordance with ASTM C 136. After the initial test, a minimum of one sieve analysis (ASTM C 136 and ASTM D 422) shall be performed for each 1,000 tons of base course placed, with a minimum of one analysis performed for each day's run until the course is completed. One liquid limit and plasticity index shall be performed for each sieve analysis per ASTM D 4318
- Wear tests shall be performed in accordance with ASTM C 131. A minimum of one test per base course material source shall be run.
- Thickness of the aggregate surface course and base course shall be measured for each 600 square yards of material placed. Compacted thickness of the base course shall be as presented in this report and the completed section shall be within 3/8-inch of the thickness presented.
- Hot Bin gradations for the asphalt wearing course shall be tested in accordance with ASTM C 136 and ASTM C 117. A minimum of one test shall be conducted. Marshall specimens shall be taken in accordance with methods described in AI MS-2. At least two sets of specimens shall be taken. Asphalt extractions shall be performed in accordance with ASTM D 2172, Method A or B. At least one asphalt extraction shall be conducted. Field density tests shall be conducted in accordance with ASTM D 2950. One test shall be conducted for each 300 square yards of pavement placed. The mat density shall be 97.5 to 100.5 percent and the joint density shall be 95.5 to 100.5 percent of the density obtained from laboratory-compacted specimens. Thickness measurements shall be taken at a minimum of one measurement for each 1,000 square yards of pavement placed.

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

- The Job Mix Formula for the bituminous mixture shall be furnished to the Contraction Officer for approval. The formula will indicate the percentage of each stockpile and mineral filler, the percentage of each size aggregate, the percentage of bitumen, and the temperature of the completed mixture when discharged from the mixer. The Contractor shall file with the Contracting Officer certified delivery tickets for all aggregates and bituminous materials actually used in construction. The finished mixture shall be designed using procedures contained in AI MS-2 and the criteria shown below.

<u>Test Property</u>	<u>50 Blows</u>
Stability (minimum), lbs	500
Flow (maximum), 1/100-inch	8-18
Air Voids, percent	3% to 5%
Percent Voids in mineral aggregate	14
TSR, minimum percent	75

- The contractor shall be responsible for the development of the mixture proportion study for cementitious materials and chemical admixtures. The concrete mix design shall include a statement giving the maximum nominal coarse aggregate size and the proportions of all ingredients that will be used in the manufacture of concrete at least 60 days prior to commencing concrete operations. Trial design batches, mixture proportioning studies, and testing requirements shall be the responsibility of the Contractor. Strength requirements shall be based on flexural strength. Trial mixtures having proportions, slumps, and air content suitable for the work shall be based on methodology described in ACI 211.1, modified as necessary to accommodate flexural strength. The maximum water-cementitious material ratio is 0.45. Coarse and fine aggregates shall have a satisfactory service record of at least 5 years successful service in three paving projects, or if a new source is used, shall meet the requirements when tested for resistance to freezing and thawing. Coarse and fine aggregates not having a satisfactory demonstrable service record shall have a durability factor of 50 when subjected to freezing and thawing in concrete in accordance with COE CRD-C 114 (Test Method for Soundness of Aggregates by Freezing and Thawing of Concrete Specimens).
- Smoothness measurements shall be taken in successive positions parallel to the pavement (flexible and rigid) centerline with a 12-foot straightedge. Measurements shall be taken perpendicular to the pavement (flexible and rigid) centerline at 15-foot intervals. Surface smoothness shall not exceed 3/8-inch.

**c. Requirements for the Design-Build Contractor's Foundation and Pavement Design**

**Analysis.** The successful proposer shall provide a Foundation and Pavement Design Analysis after contract award. *The geotechnical firm responsible for the geotechnical design shall have demonstrated successful performance in design of at least five (5) projects of similar type and*

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

*scope in expansive soil environments in Louisiana.* The Foundation and Pavement Design Analysis (Report) shall include a description of the project, including a discussion of any unusual features of the project, a discussion for each structure that requires a foundation system, and a discussion of each pavement type. All calculations in support of bearing, settlement, heave, and structural deflections shall be included in or attached to the report.

(1) **Foundation System.** ***A shallow foundation system consisting of either a reinforced concrete ribbed mat slab or a reinforced concrete flat mat slab shall be utilized for the facilities included in the Tactical Equipment Maintenance Facility and Company Operations Facilities projects. The Design-Build Contractor shall design the shallow foundation system in accordance with the requirements, recommendations, and design parameters provided in this report.***

(2) **Subgrade Preparation and Fill Requirements.** ***The Design-Build Contractor shall comply with the subgrade preparation and fill (earthwork) requirements specified in this report. Compaction requirements for the raw subgrade, fill, and backfill materials, and foundation and pavement material definitions shall be as specified herein.***

(3) **Pavement Sections.** The Design-Build Contractor shall provide separate subparagraphs for each rigid and flexible pavement structure included in the project, ***using the pavement sections provided in this report as minimum sections.*** The Design-Build Contractor shall use the UFCs cited herein and PCASE pavement design software to develop the final pavement designs, and shall present PCASE design output data tables in their report documentation for review by the Government. Each pavement design shall include as a minimum the following items: traffic types, road classifications and design indexes; subgrade strength values (CBR and modulus of subgrade reaction values for the specified compactive effort); pavement material thicknesses and compaction requirements; and concrete flexural strength for designated time frame.

**FORT POLK, LOUISIANA**  
**UNIT OPERATIONS FACILITIES (TEMF & COF)**

(4) Exhibits to be Included in the Design-Build Contractor's Foundation and Pavement Design Analysis. The following exhibits shall be included in the Design-Build contractor's Foundation and Pavement Design Analysis. The Design-Build contractor may use the information provided in this report to partially satisfy these requirements, but shall supplement the information provided herein with additional subsurface drilling and testing, as described in the first paragraph of Section 5 of this report. Required exhibits to be included with the Design-Build contractor's Foundation and Pavement Design Analysis include:

- Site Plan with Boring Locations and Legend;
- Boring Logs;
- Plasticity Chart;
- Standard Penetration Tests versus Depth of Boring (if applicable);
- Moisture Content versus Depth (Chart);
- Moisture Content-Liquid Limit-Plastic Limit versus Depth (Chart);
- Strength Tests Results versus Depth (Chart);
- Tabulation of Laboratory Test Results (to include Boring Number, Sample Number, Depth, Laboratory Classification, Visual Descriptions, Grain Size Analysis (%Gravel, %Sand, %Fines), LL, PL, PI, MC, Unit Weight, and Strength Test Data;
- Consolidation-Expansion Tests/Swell Pressure Tests (if applicable).

**FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES (TEMF & COF)**

**References:**

- TEAM Consultants, Incorporated Report No. 102040
- UFC 3-220-03FA – Soils and Geology Procedures for Foundation Design of Buildings and Other Structures (Except Hydraulic Structures)
- UFC 3-220-07 – Foundations in Expansive Soils
- CESWD-ED-TS/G Criteria Letter, dated 29 January 1988 – Design Criteria for Ribbed Mat Foundations
- SWDED-G Criteria Letter, dated 16 April 1987 – Criteria for Developing Geotechnical Design Parameters for SWD Ribbed Mat Design Methodology
- UFC 3-250-01FA – Pavement Design for Roads, Streets, Walks, and Open Storage Areas
- UFC 3-250-18FA – General Provisions and Geometric Design For Roads, Streets, Walks, and Open Storage Areas
- UFC 3.320-06A – Concrete Floor Slabs on Grade Subjected to Heavy Loads
- Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges

**FORT WORTH DISTRICT  
JULY 2010**



## **APPENDIX A**

### **BORING LOCATIONS & LOGS OF BORINGS**



LOG OF BORING NO. 10A2S-TEMF-1  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger  
Location: See Figure 1

DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLIND PER FT	UNIT DRY WEIGHT, PCF	SHEAR STRENGTH, TONS/FT2	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	PLASTICITY INDEX
0		CLAY, Sandy, Firm, Reddish Brown, with ferric staining (possible fill)							
5		CLAY, Silty, Sandy, Firm, Pinkish Brown, Damp							
10		SAND, Silty, Clayey, Loose, Pinkish Brown, Damp							
11.5		Boring Terminated							

DEPTH DRILLED: 11.5 ft  
DATE DRILLED: 5/21/2010  
DEPTH TO WATER: N/A  
DATE MEASURED: 5/21/2010  
PROJ. No.: AAAD-025-00  
FIGURE: 1

LOG OF BORING NO. 10A2S-TEMF-2  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger  
Location: See Figure 1

DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLIND PER FT	UNIT DRY WEIGHT, PCF	SHEAR STRENGTH, TONS/FT2	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	PLASTICITY INDEX
0		CLAY, Silty, Sandy, Soft, Dark Brown, Damp, with ferric staining (possible fill)							
4		fill to a depth of 4 ft.							
5		CLAY, Silty, Sandy, Firm, Reddish Brown, Damp, with ferric staining							
10		Boring Terminated							

DEPTH DRILLED: 11.5 ft  
DATE DRILLED: 5/19/2010  
DEPTH TO WATER: N/A  
DATE MEASURED: 5/19/2010  
PROJ. No.: AAAD-025-00  
FIGURE: 2

LOG OF BORING NO. 10A2S-TEMF-3  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger  
Location: See Figure 1

DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLIND PER FT	UNIT DRY WEIGHT, PCF	SHEAR STRENGTH, TONS/FT2	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	PLASTICITY INDEX
0		CLAY, Sandy, Firm, Reddish Brown, with ferric staining							
5		SAND, Silty, Clayey, Firm, Loose to Medium Dense, Pinkish Brown, Damp							
10		Boring Terminated							

DEPTH DRILLED: 11.5 ft  
DATE DRILLED: 5/21/2010  
DEPTH TO WATER: N/A  
DATE MEASURED: 5/21/2010  
PROJ. No.: AAAD-025-00  
FIGURE: 3

LOG OF BORING NO. 8A2S-TEMF-4  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary  
Location: See Figure 1

DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLIND PER FT	UNIT DRY WEIGHT, PCF	SHEAR STRENGTH, TONS/FT2	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	PLASTICITY INDEX
0		SAND, Silty, Clayey, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining (medium to fine grain sand) (continued)							
10		SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet							
16.5		Boring Terminated							

DEPTH DRILLED: 61.5 ft  
DATE DRILLED: 5/20/2010  
DEPTH TO WATER: 18.5 ft  
DATE MEASURED: 5/20/2010  
PROJ. No.: AAAD-025-00  
FIGURE: 4b

LOG OF BORING NO. 8A2S-TEMF-4  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary  
Location: See Figure 1

DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLIND PER FT	UNIT DRY WEIGHT, PCF	SHEAR STRENGTH, TONS/FT2	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	PLASTICITY INDEX
0		SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet (continued)							
11		CLAY, Silty, Sandy, Soft, Reddish Brown, Wet, with ferric stain							
20		CLAY, Silty, Gray, Wet, with reddish brown layers							
27		CLAY, Silty, Gray, Wet, with reddish brown layers							
30		SAND, Silty, Gray, Wet, with reddish brown layers							
45		Boring Terminated							

DEPTH DRILLED: 61.5 ft  
DATE DRILLED: 5/20/2010  
DEPTH TO WATER: 18.5 ft  
DATE MEASURED: 5/20/2010  
PROJ. No.: AAAD-025-00  
FIGURE: 4c

LOG OF BORING NO. 8A2S-TEMF-4  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary  
Location: See Figure 1

DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLIND PER FT	UNIT DRY WEIGHT, PCF	SHEAR STRENGTH, TONS/FT2	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	PLASTICITY INDEX
0		CLAY, Silty, Gray, Wet, with reddish brown layers (continued)							
8		Boring Terminated							

DEPTH DRILLED: 61.5 ft  
DATE DRILLED: 5/20/2010  
DEPTH TO WATER: 18.5 ft  
DATE MEASURED: 5/20/2010  
PROJ. No.: AAAD-025-00  
FIGURE: 4d

LOG OF BORING NO. 8A2S-TEMF-4  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary  
Location: See Figure 1

DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLIND PER FT	UNIT DRY WEIGHT, PCF	SHEAR STRENGTH, TONS/FT2	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	PLASTICITY INDEX
0		CLAY, Silty, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining							
5		SILT, Clayey, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining							
10		CLAY, Silty, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining							
11		SAND, Silty, Clayey, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining (medium to fine grain sand)							
15		possible fill at 11.5 ft							
18.5		Boring Terminated							

DEPTH DRILLED: 61.5 ft  
DATE DRILLED: 5/20/2010  
DEPTH TO WATER: 18.5 ft  
DATE MEASURED: 5/20/2010  
PROJ. No.: AAAD-025-00  
FIGURE: 4e

US Army Corps of Engineers  
Fort Worth District

Designed by:	Date:	Rev.
Drawn by:	Soil No.	
Reviewed by:	Cont. No.	
Submitted by:	Submitted Date:	

ENGINEERING/  
CONSTRUCTION DIVISION  
DESIGN BRANCH

FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
PN: 069199

LOGS OF BORING 1 OF 7

Sheet  
reference  
number:  
B-201

1. USE THIS SHEET FOR BORING LOGS ONLY.

2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.

3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.

4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.

5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.



LOG OF BORING NO. 10A2S-TEMF-10										
Unit Operations Facility										
Fort Polk RFP Support (KHM No. 101228.01)										
Leesville, Louisiana										
DRILLING METHOD: Straight Flight Auger				LOCATION: See Figure 1						
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	DEPTH, FT	UNIT WT., LB/FT <sup>3</sup>	SHEAR STRENGTH, TONS/FT <sup>2</sup>				REMARKS
						0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0				
						PLASTIC LIMIT LIQUID LIMIT WATER CONTENT				
						10 20 30 40 50 60 70 80				
			ASPHALT (0.5 inches)							
			SAND, Silty, Clayey, Loose, Reddish Brown, Loose, with ferric staining and traces of gravel							
			CLAY, Sandy, Stiff, Reddish Brown, Damp, with ferric staining	6						
5			CLAY, Sandy, Silty, Stiff, Reddish Brown, Damp, with ferric staining	9						
				12						
10				11						
			possible fill to 11.5 ft Boring Terminated							
15										

DEPTH DRILLED: 11.5 ft  
DATE DRILLED: 5/21/2010

DEPTH TO WATER: N/A  
DATE MEASURED: 5/21/2010

PROJ. No.: AAA0-025-00  
FIGURE: 10

LOG OF BORING NO. 8A2S-TEMF-21																				
Unit Operations Facility																				
Fort Polk RFP Support (KMN No. 101228.01)																				
Leesville, Louisiana																				
TBPE Firm Registration No. F-3257																				
Drilling Method: Straight Flight Auger & Mud Rotary																				
LOCATION: See Figure 1																				
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	Borehole ID #1	Unit Weight lb/cu. ft	SHEAR STRENGTH, TONS/FT <sup>2</sup>										PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	PERCENT FINE	Z. 200
						0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0							
			CLAY, Silty, Stiff, Gray, Wet, with tan layers and ferric staining (continued)																	
			Boring Terminated	11																
65																				
70																				
75																				
DEPTH DRILLED: 61.5 ft		DATE DRILLED: 5/20/2010		DEPTH TO WATER: 17.8 ft		DATE MEASURED: 5/20/2010		PROJ. No.:		FIGURE:		21d		AAAO-025-00						

**NOTES:**

<p>1. USE THIS SHEET FOR BORING LOGS ONLY.</p> <p>2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.</p>	<p>3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.</p> <p>4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.</p> <p>5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.</p>
--	---

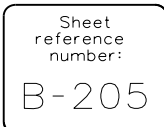


[illegible]

LOG OF BORING NO. 8A2S-COF-14				Unit Operations Facility				TBPE Firm Registration No. F-3257							
Fort Polk RFP Support (KMH No. 101228.01)				Leesville, Louisiana											
DRILLING METHOD: Straight Flight Auger & Mud Rotary				LOCATION: See Figure 1											
DEPTH, FT	STANDARD SAMPLES	DESCRIPTION OF MATERIAL	BORE HOLE #1 UNIT DR. NO. WATER-LOG	SHEAR STRENGTH, TONS/FT <sup>2</sup>								PLASTIC LIMIT WATER CONTENT LIQUID LIMIT	SHEAR STRENGTH, TONS/FT <sup>2</sup>	PLASTIC LIMIT WATER CONTENT LIQUID LIMIT	
				0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0				
25		SAND, Silty, Loose, Pinkish Brown to Reddish Brown, Damp to Wet (continued)													
30		- tan from 30 ft to 34 ft													
35		- reddish brown and clayey from 34 ft to 45 ft													
40															
45															
50															
55															
60															
65															
70															
75															
80															
85															
90															
95															
100															
105															
110															
115															
120															
125															
130															
135															
140															
145															
150															
155															
160															
165															
170															
175															
180															
185															
190															
195															
200															
205															
210															
215															
220															
225															
230															
235															
240															
245															
250															
255															
260															
265															
270															
275															
280															
285															
290															
295															
300															
305															
310															
315															
320															
325															
330															
335															
340															
345															
350															
355															
360															
365															
370															
375															
380															
385															
390															
395															
400															
405															
410															
415															
420															
425															
430															
435															
440															
445															
450															
455															
460															
465															
470															
475															
480															
485															
490															
495															
500															
505															
510															
515															
520															
525															
530															
535															
540															
545															
550															
555															
560															
565															
570															
575															
580															
585															
590															
595															
600															
605															
610															
615															
620															
625															
630															
635															
640															
645															
650															
655															
660															
665															
670															
675															
680															
685															
690															
695															
700															
705															
710															
715															
720															
725															
730															
735															
740															
745															
750															
755															
760															
765															
770															
775															
780															
785															
790															
795															
800															
805															
810															
815															
820															
825															
830															
835															
840															
845															
850															
85															

**NOTES:**

<p>1. USE THIS SHEET FOR BORING LOGS ONLY.</p> <p>2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.</p>	<p>3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.</p> <p>4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.</p> <p>5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.</p>
--	---



# LOG OF BORING NO. 10A2S-COF-16

Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

TBPE Firm Registration No. F-3257

BELLING  
THOD:

Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL SAMPLED	DESCRIPTION OF MATERIAL	BLIND PER FT	SHEAR STRENGTH, TONS/FT <sup>2</sup>										WATER CONTENT	PLASTICITY INDEX
				0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0				
				<div style="display: flex; justify-content: space-between; font-size: 0.8em;"> <span>PLASTIC LIMIT</span> <span>LIQUID LIMIT</span> </div>											
0		CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining													
5		SAND, Clayey, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining - lightens to tan and pink layers at depth possible fill from 0 to 11.5 ft.	10												
10			7												
15		Boring Terminated													

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

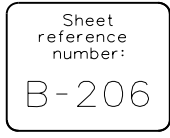
DEPTH DRILLED: 11.5 ft  
 DATE DRILLED: 5/18/2010

DEPTH TO WATER: N/A  
 DATE MEASURED: 5/18/2010


PROJ. No.: AAA0-025-00  
 FIGURE: 16

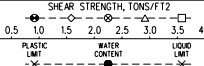
[illegible]

3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.
4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.





LOG OF BORING NO. 8A2S-COF-18					Unit Operations Facility					TBPB Form Registration No. F-3257						
Fort Polk RFP Support (KM No. 101228.01)					Leesville, Louisiana											
DRILLING METHOD: Straight Flight Auger & Mud Rotary					LOCATION: See Figure 1											
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLAND, PPT/FT	WATER CONTENT, %	SHEAR STRENGTH, TONS/FT <sup>2</sup>										PLASTICITY INDEX
						0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0			
						PLASTIC LIMIT			WATER CONTENT			LIQUID LIMIT				
						--X--			--●--			--X--				
						10	20	30	40	50	60	70	80			
			CLAY, Silty, Stiff, Gray, Wet, with ferric staining (continued)													
			Boring Terminated													
65																
70																
75																
DEPTH DRILLED: 62.0 ft		DATE DRILLED: 5/18/2010		DEPTH TO WATER: 15.0 ft		DATE MEASURED: 5/18/2010		PROJ. No.: AAA0-025-00		FIGURE: 18d						

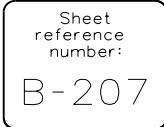
LOG OF BORING NO. 10A2S-COF-20					Unit Operations Facility Fort Polk RFP Support (KMN No. 101228.01) Leesville, Louisiana					TEPE Firm Registration No. F-3257						
DRILLING METHOD:		Straight Flight Auger			LOCATION:		See Figure 1									
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BORER REF #1	UNIT WEIGHT, PCF	SHEAR STRENGTH, TONS/FT <sup>2</sup>										VELOCITY, FT/SEC
																
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT								
			CLAY, Sandy, Silty, Firm, Brown, Damp, with organics			10	20	30	40	50	60	70	80			
5			CLAY, Sandy, Silty, Firm to Soft, Reddish Brown, Damp, with ferric staining possible fill from 0 to 11.2 ft.													
9																
15			Boring Terminated													

DEPTH DRILLED: 11.5 ft  
DATE DRILLED: 5/18/2010

DEPTH TO WATER: N/A  
DATE MEASURED: 5/18/2010

PROJ. No.: AAA0-025-00  
FIGURE: 20

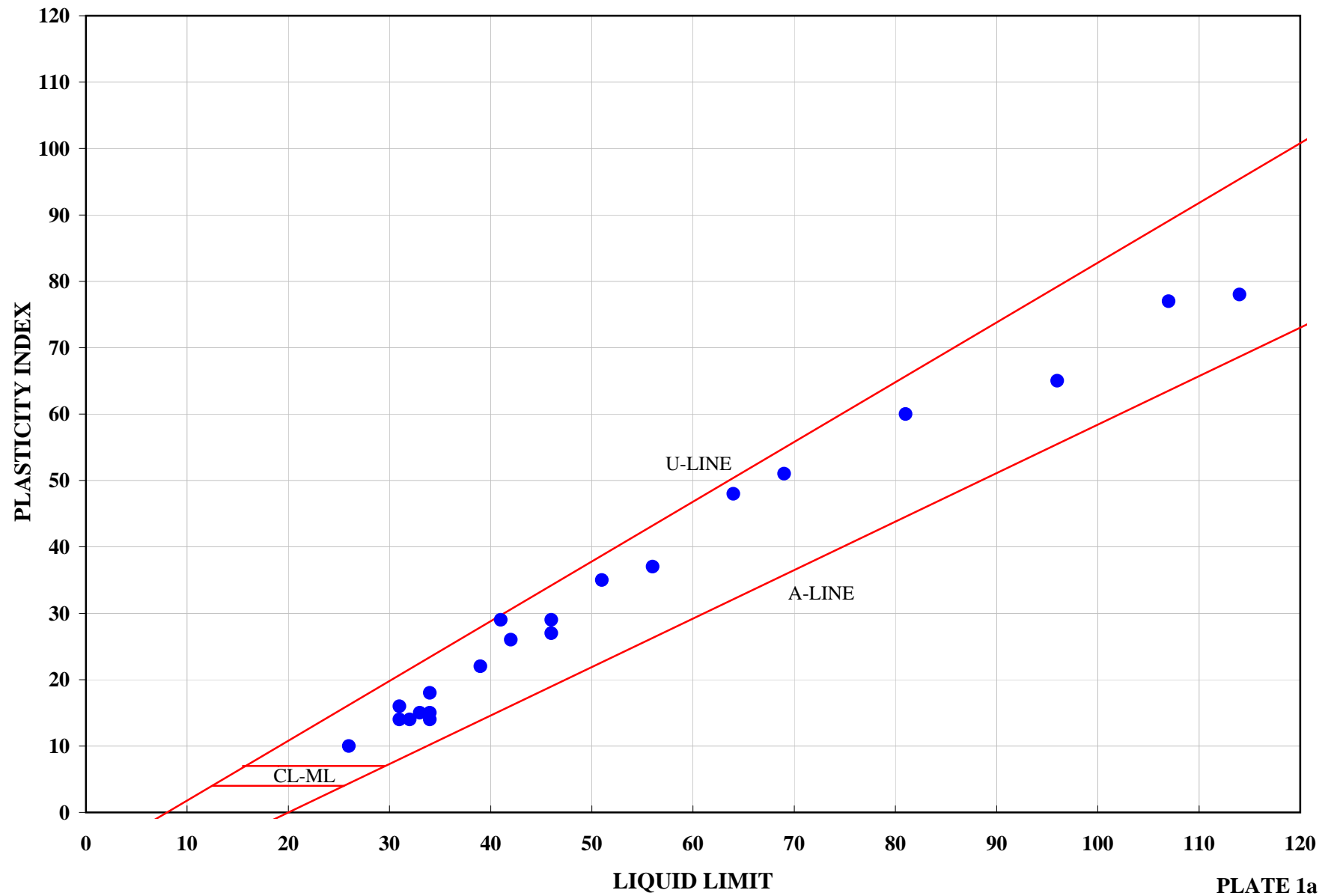
NOTES:	3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.
1. USE THIS SHEET FOR BORING LOGS ONLY.	4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.	5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.



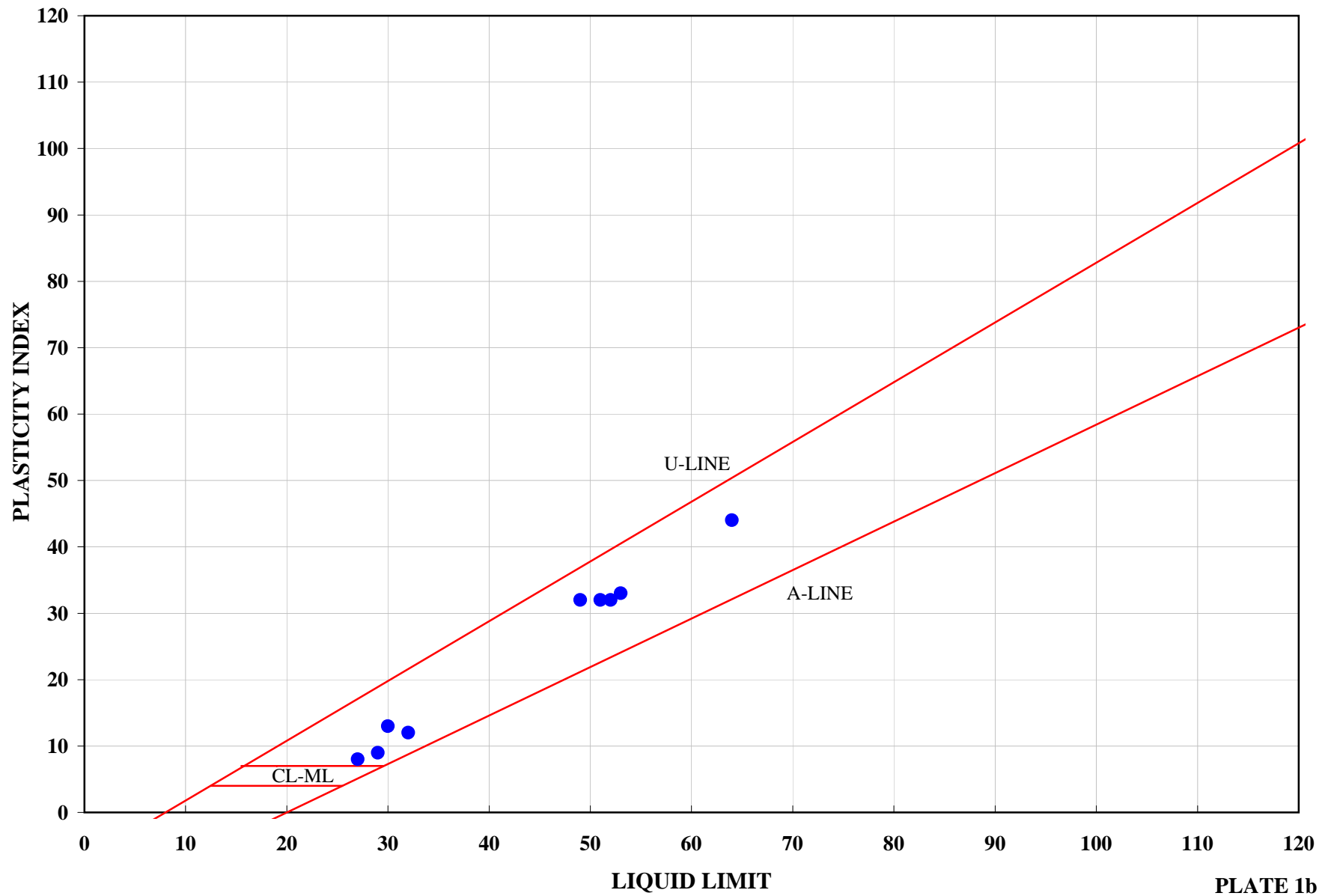
## **APPENDIX B**

### **LABORATORY TESTING & SPT DATA PLOTS**

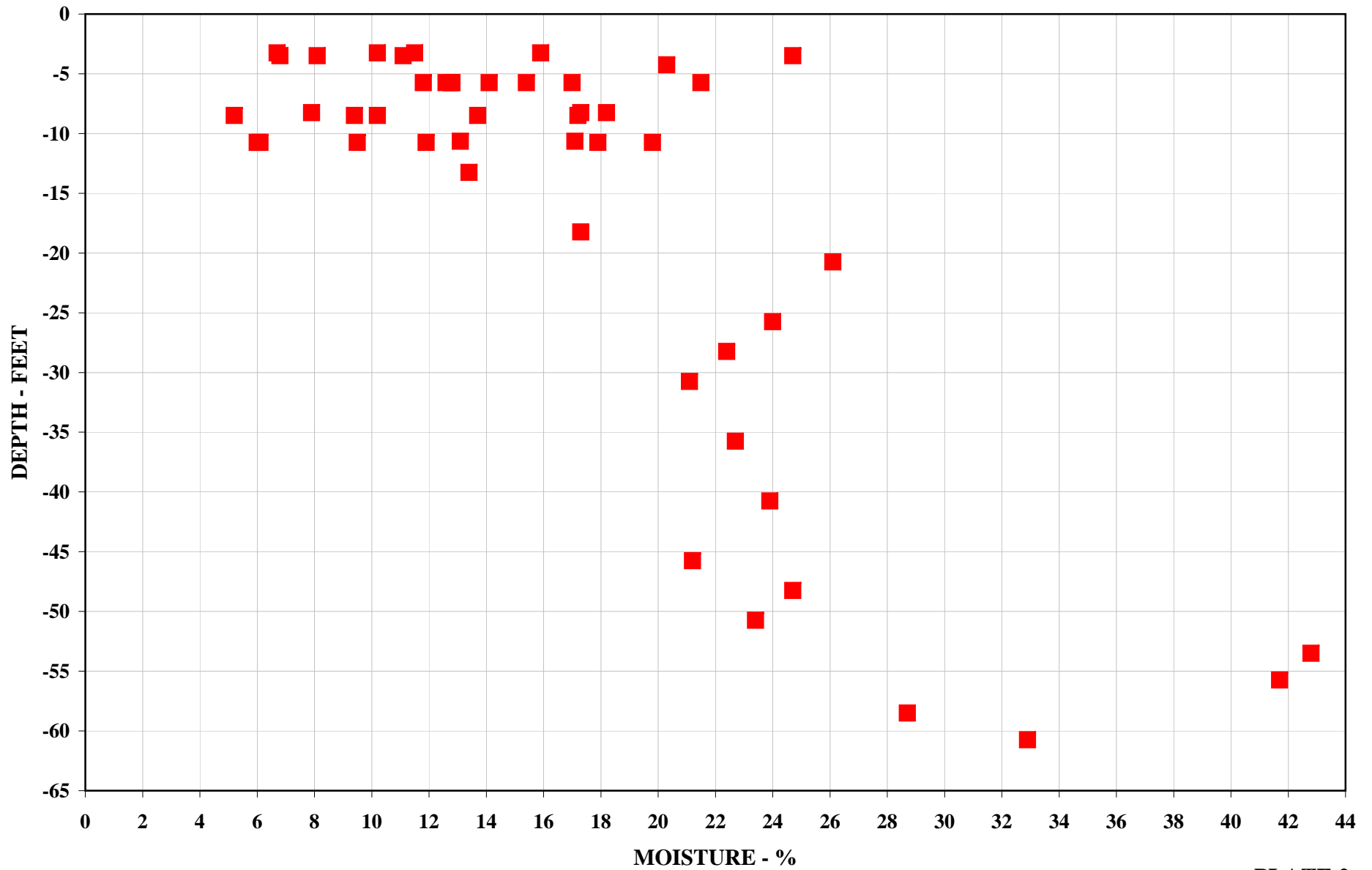
# UNIT OPERATIONS FACILITIES - TEMF SITE PLASTICITY CHART



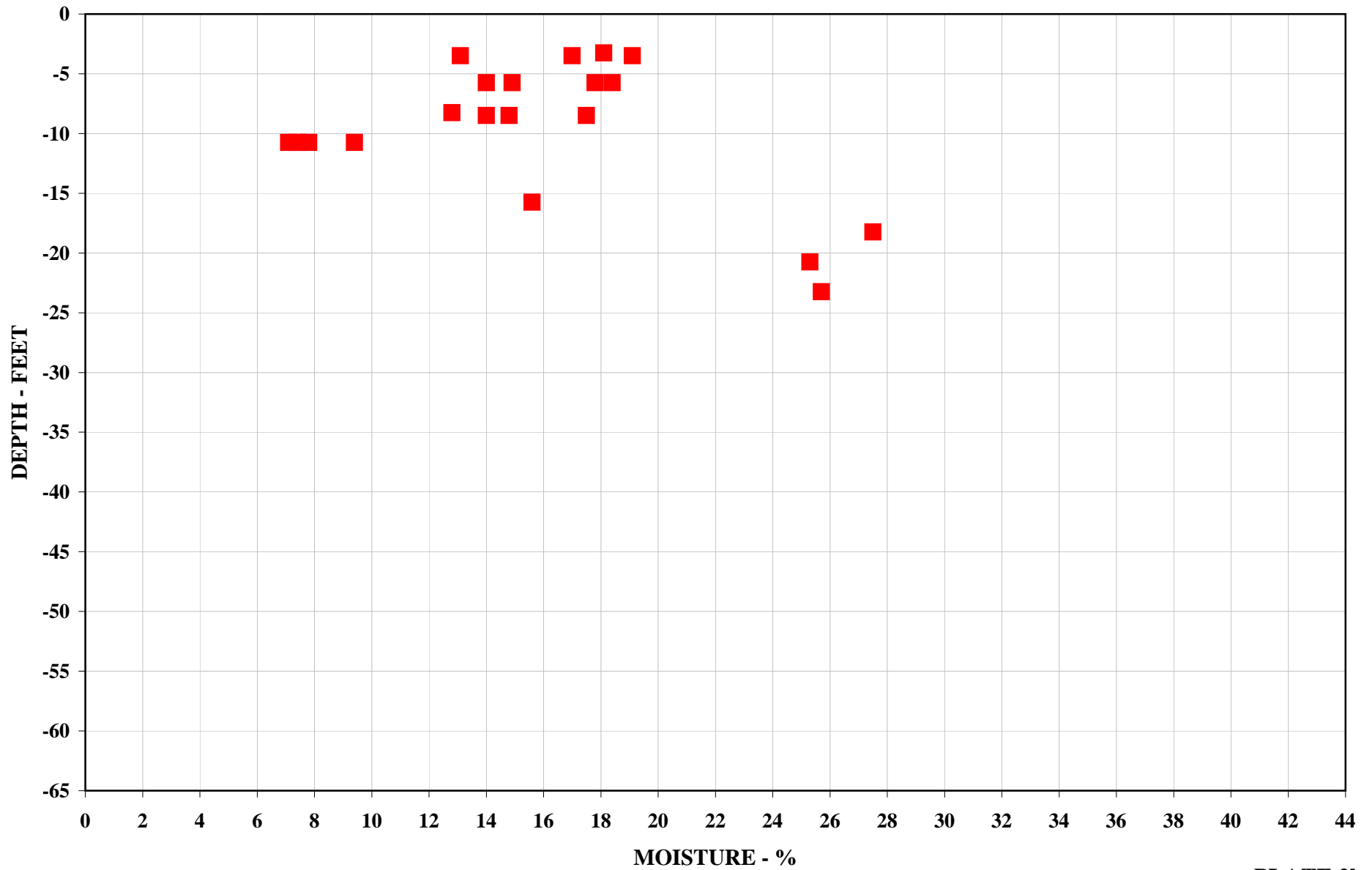
# UNIT OPERATIONS FACILITIES - COF SITE PLASTICITY CHART



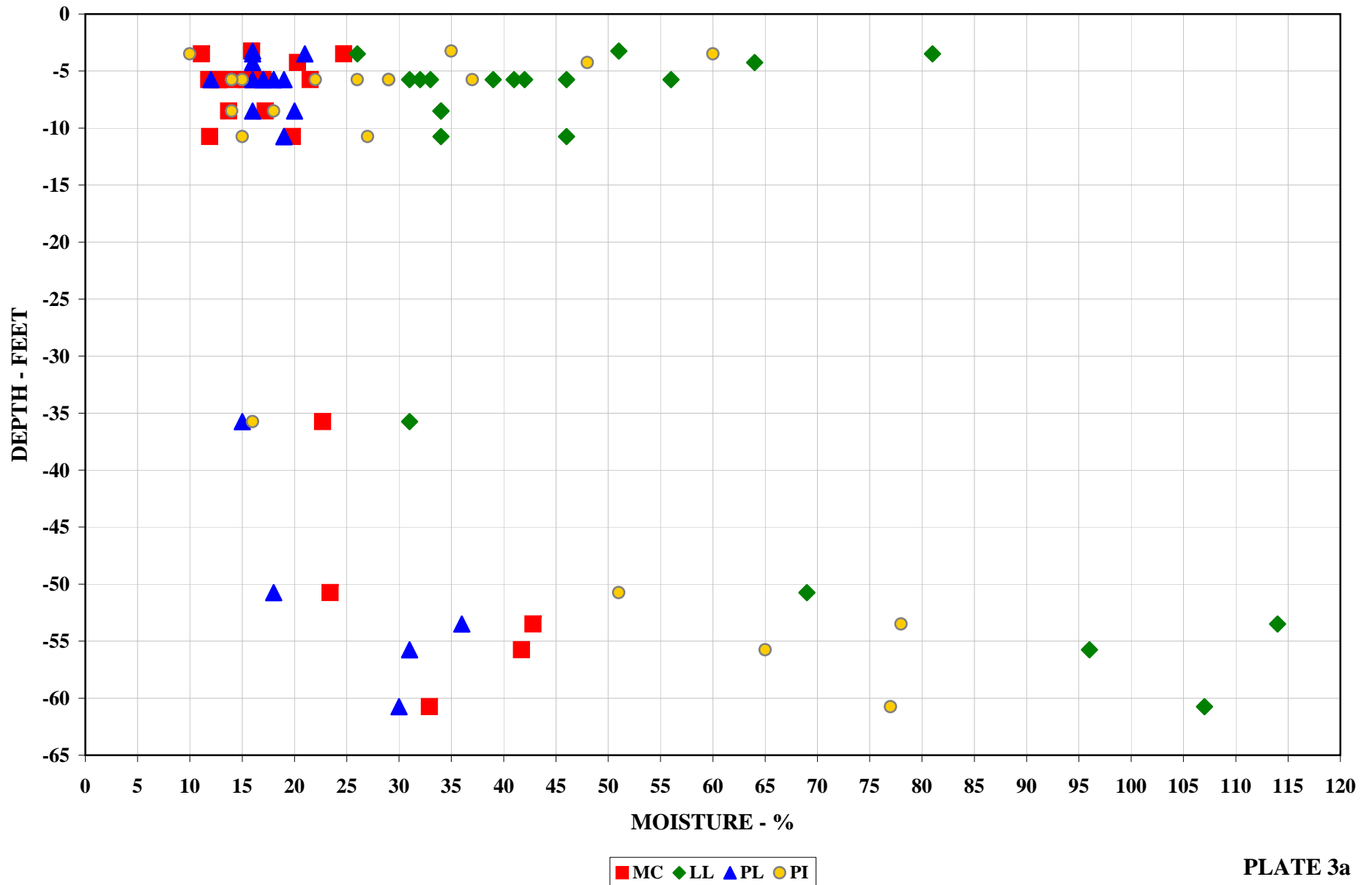
**UNIT OPERATIONS FACILITIES - TEMF SITE**  
**MOISTURE CONTENT VS DEPTH**



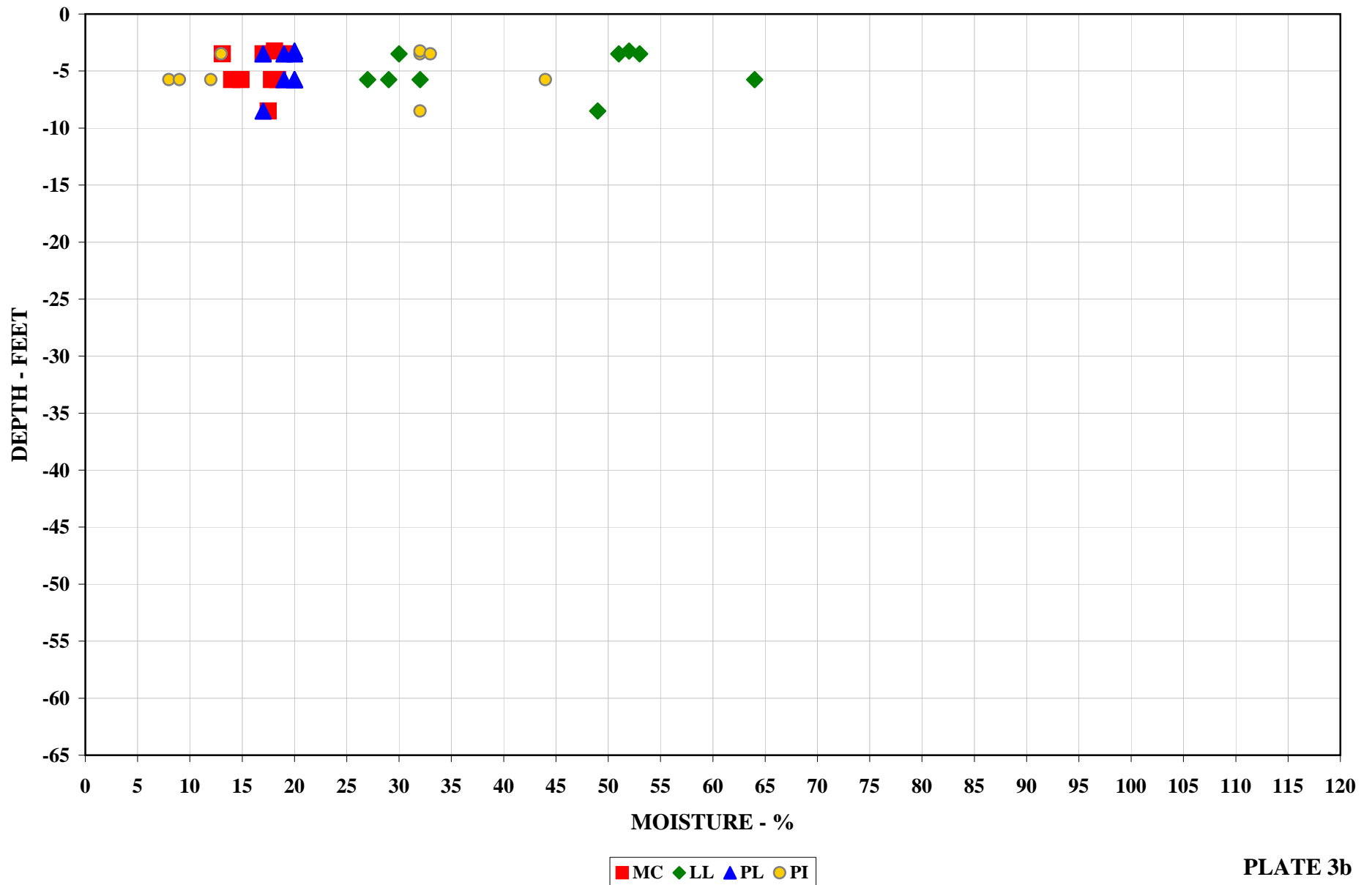
# UNIT OPERATIONS FACILITIES - COF SITE MOISTURE CONTENT VS DEPTH



# UNIT OPERATIONS FACILITIES - TEMF SITE ATTERBERG LIMITS VS DEPTH

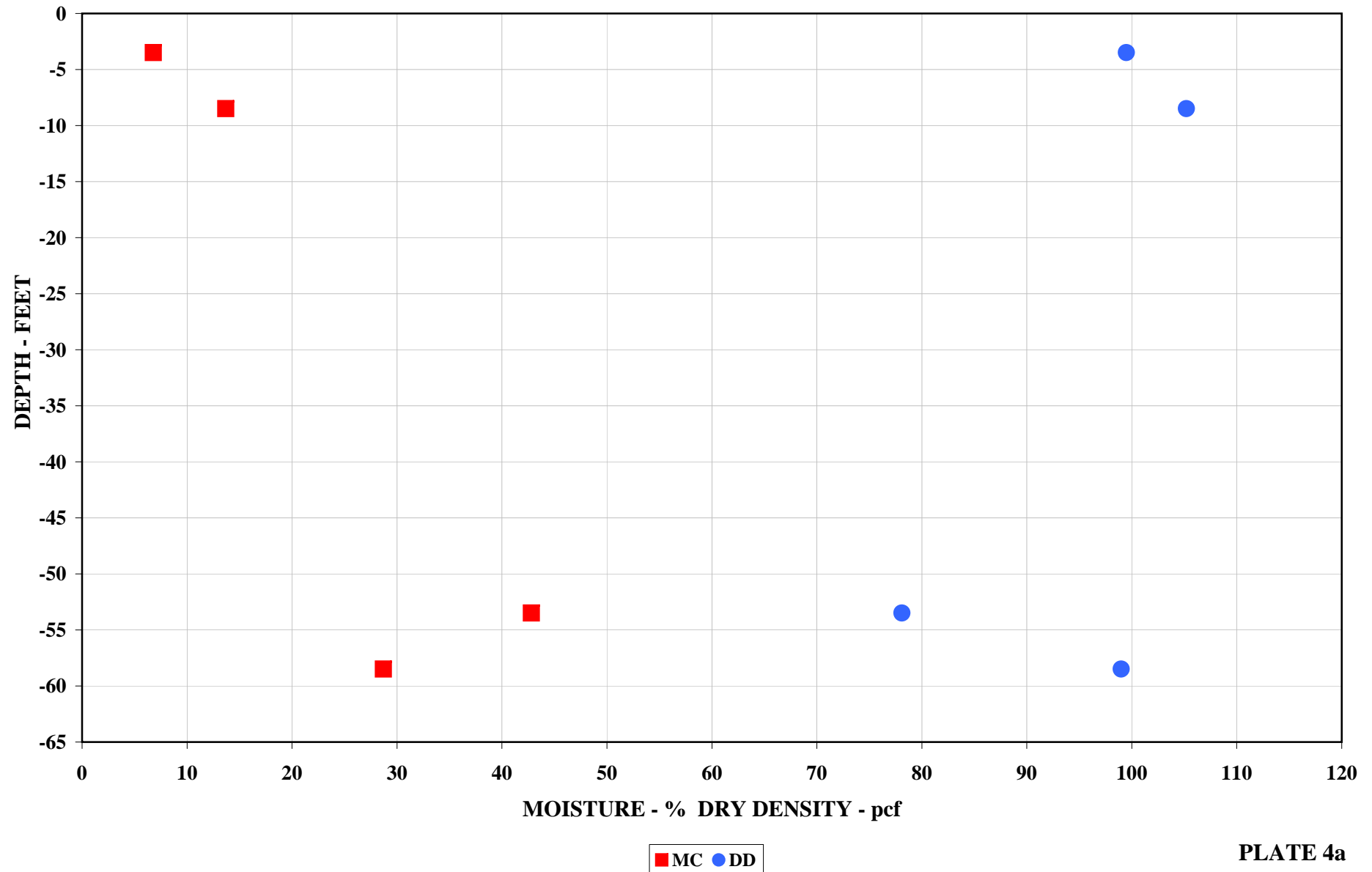


# UNIT OPERATIONS FACILITIES - COF SITE ATTERBERG LIMITS VS DEPTH

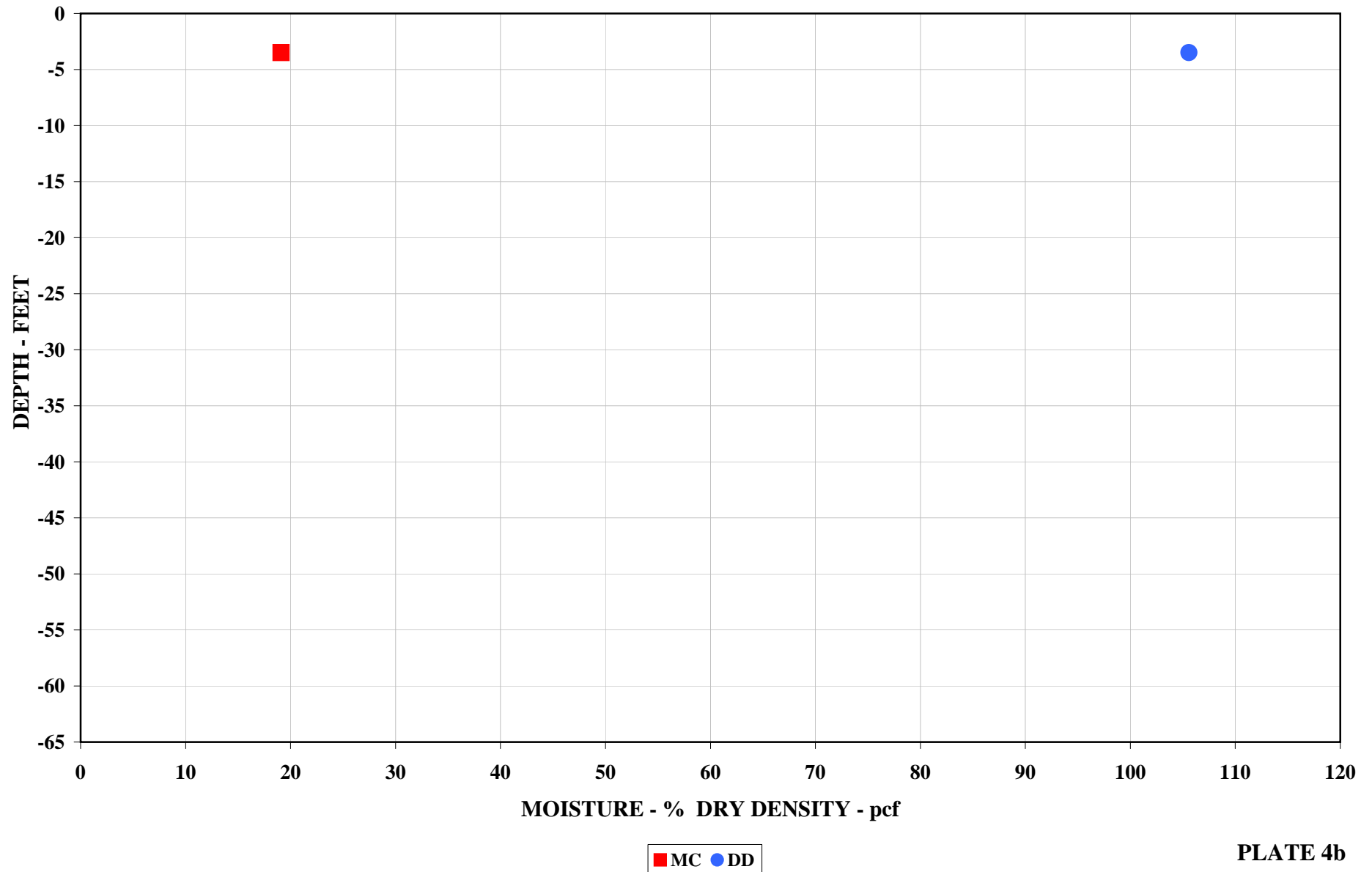




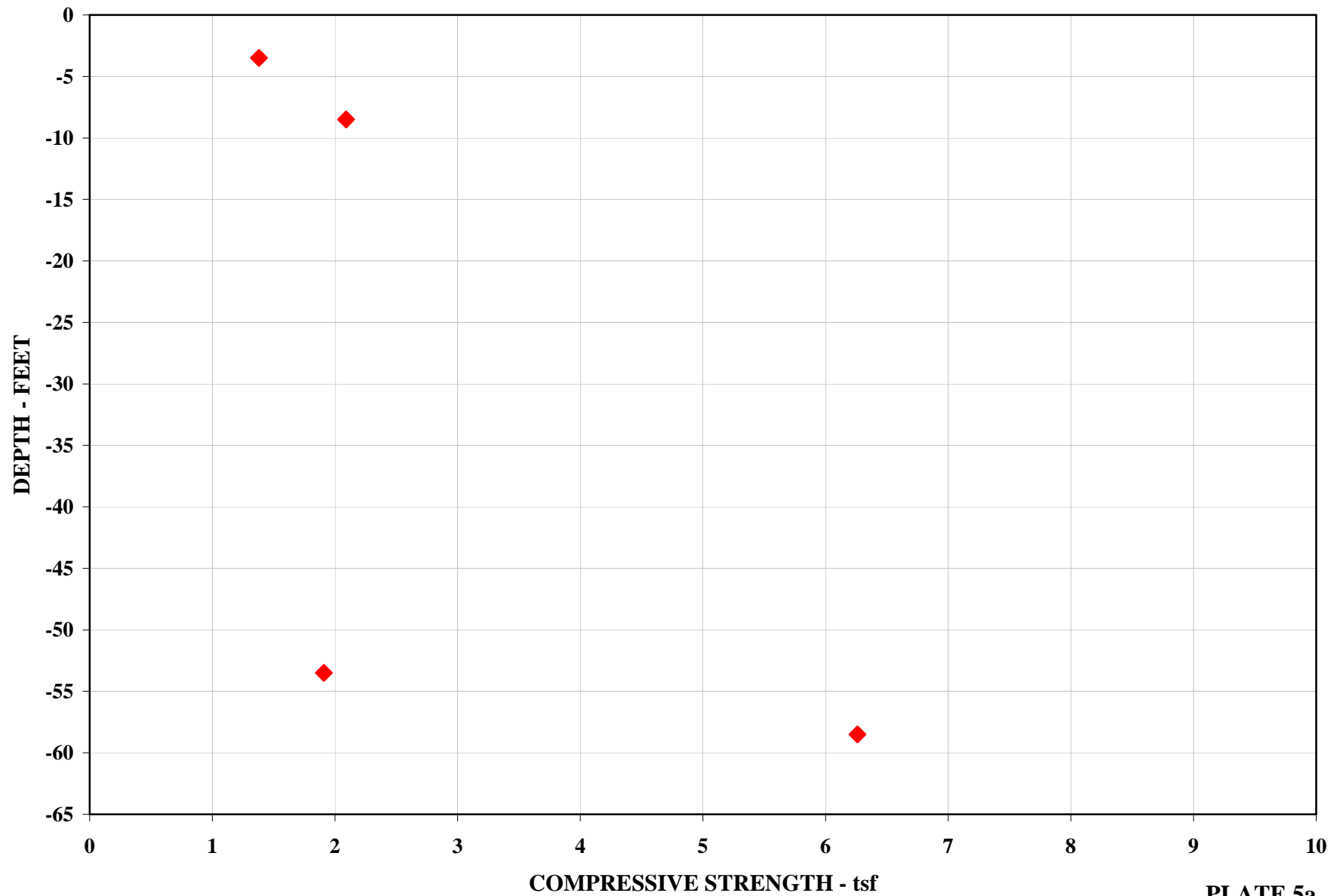
**UNIT OPERATIONS FACILITIES - TEMF SITE**  
**MOISTURE CONTENT - DRY DENSITY VS DEPTH**



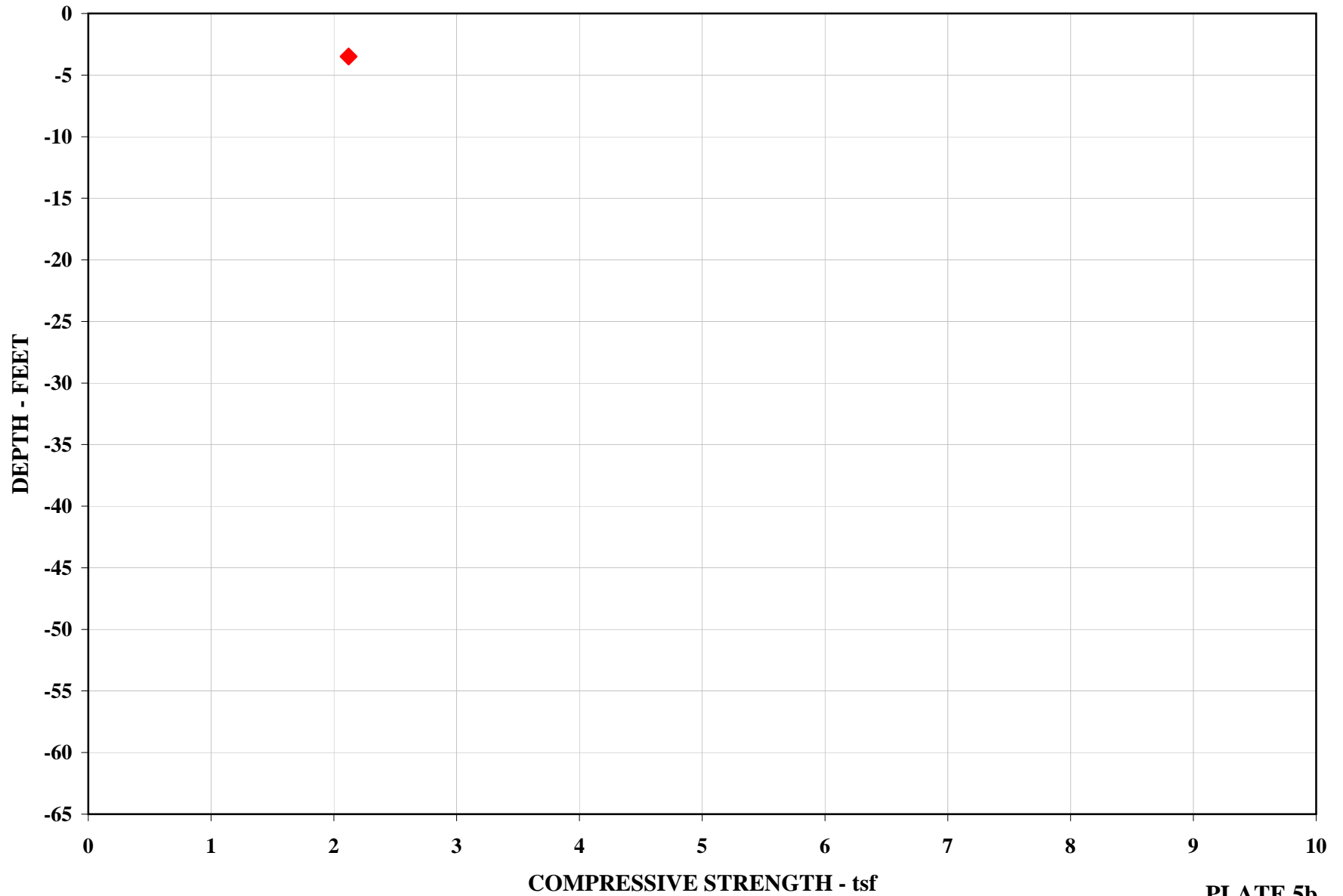
# UNIT OPERATIONS FACILITIES - COF SITE MOISTURE CONTENT - DRY DENSITY VS DEPTH

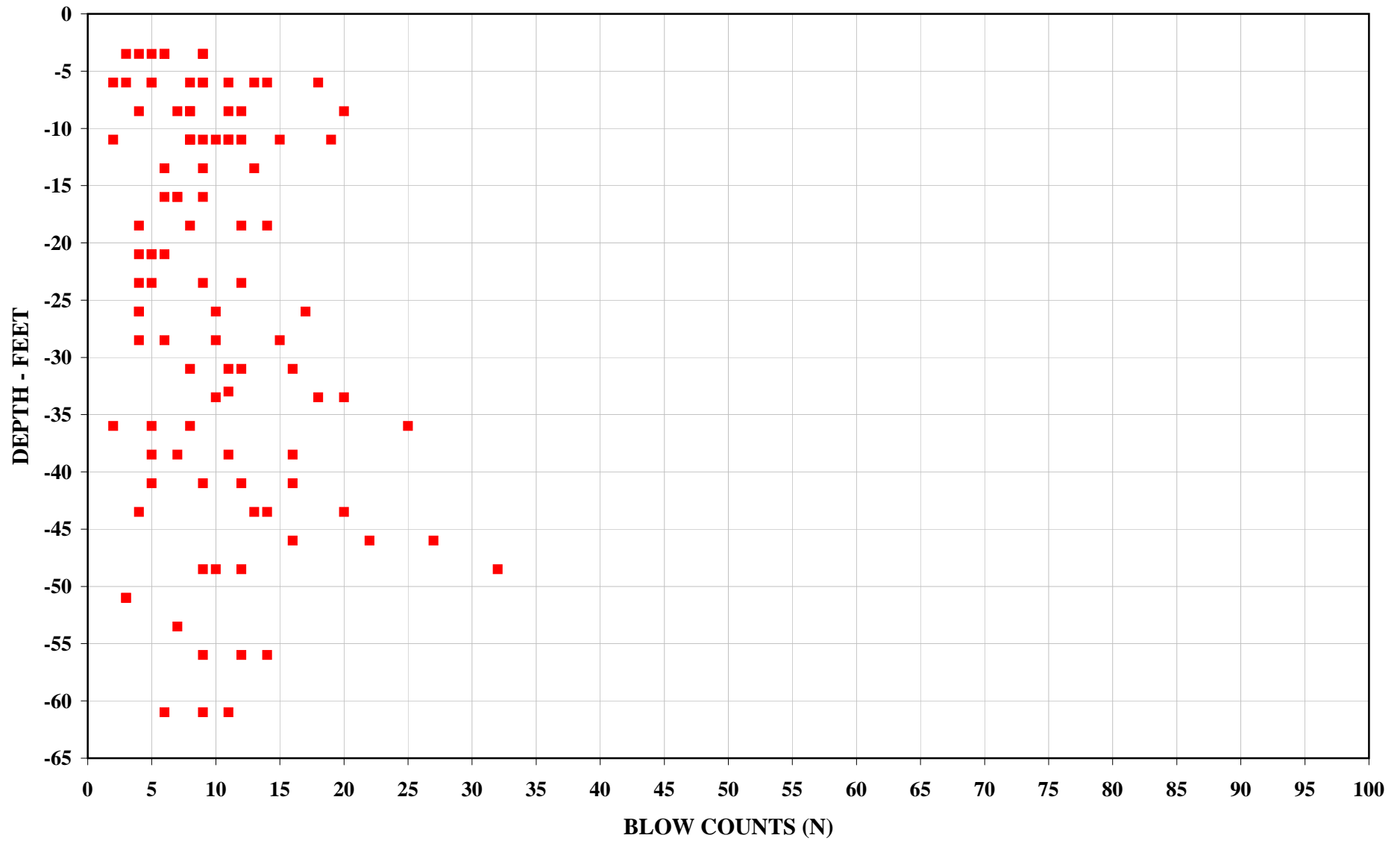


# UNIT OPERATIONS FACILITIES - TEMF SITE ULTIMATE COMPRESSIVE STRENGTH VS DEPTH

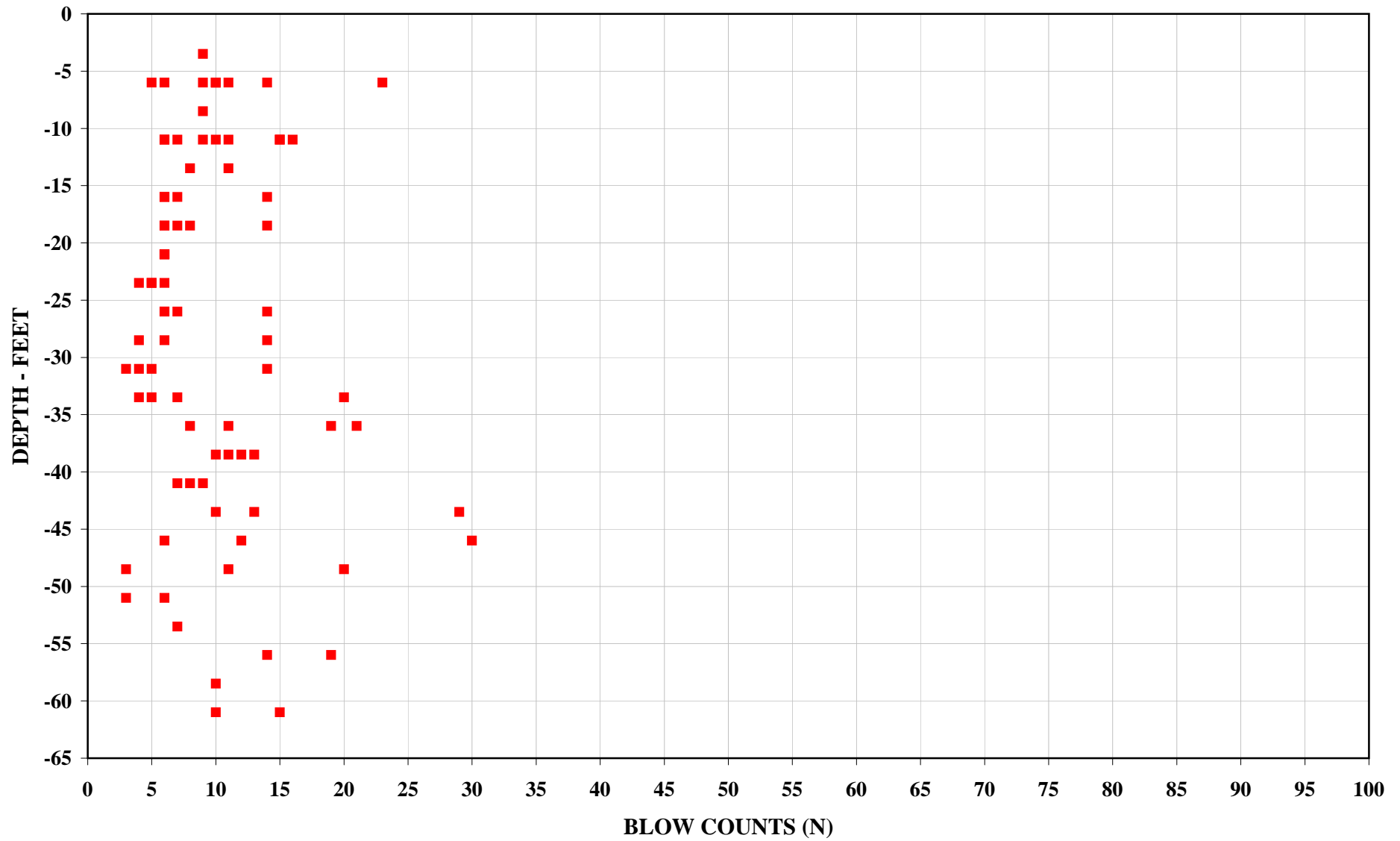


# UNIT OPERATIONS FACILITIES - COF SITE ULTIMATE COMPRESSIVE STRENGTH VS DEPTH





# **UNIT OPERATIONS FACILITIES - COF SITE** **STANDARD PENETRATION TEST BLOW COUNTS VS DEPTH**



## **APPENDIX C**

### **LABORATORY TESTING DATA**

SUMMARY OF LABORATORY TEST RESULTS												
LABORATORY TESTING SERVICES UNIT OPERATIONS FACILITIES FORT POLK, LOUISIANA												
Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Percent Passing Sieve							
					#4	#10	#20	#40	#60	#80	#100	#200
10A2S-TEMF-1	S-1	2.5-4	Tan silty sand	SM	99.6	99.2	98.8	98.1	93.9	72.5	54.5	22.0
	S-2	5-6.5	Tan sandy clay	CL	100.0	100.0	100.0	100.0	99.8	98.5	94.1	61.3
	S-3	7.5-9	Tan silty sand	SM	---	---	---	---	---	---	---	---
	S-4	10-11.3	Tan clayey sand	SC	---	---	---	---	---	---	---	---
8A2S-TEMF-4	S-1	2.5-4.5	Tan and brown silty sand	SM	100.0	100.0	99.9	99.8	94.5	68.7	52.6	19.3
	S-2	5-6.5	Tan and reddish brown sandy clay	CL	100.0	99.7	99.2	99.1	97.5	83.2	74.0	52.3
	S-3	7.5-9.5	Tan and brown sandy clay	CL	100.0	99.9	99.7	99.6	99.5	95.1	88.4	53.9
	S-4	10-11.5	Tan silty sand	SM	100.0	100.0	100.0	100.0	99.9	96.0	88.3	34.1
	S-5	12.5-14	Tan silty sand	SM	100.0	100.0	100.0	100.0	99.7	93.2	84.3	42.8
	S-7	17.5-19	Tan sand with silt	SP-SM	100.0	100.0	100.0	97.6	94.6	57.1	37.3	12.0
	S-8	20-21.5	Tan silty sand	SM	100.0	100.0	100.0	100.0	96.3	67.0	43.4	13.4
	S-10	25-26.5	Tan sand with silt	SP-SM	100.0	100.0	100.0	99.5	86.6	46.1	30.5	9.4
	S-11	27.5-29	Tan sand with silt	SP-SM	100.0	100.0	100.0	99.0	82.6	40.9	25.9	10.5
	S-12	30-31.5	Tan sand with silt	SP-SM	100.0	100.0	97.7	76.1	40.9	21.5	16.7	11.9
	S-14	35-36.5	Tan clayey sand	SC	100.0	100.0	99.1	59.8	35.2	26.3	24.1	20.3
	S-16	40-41.5	Tan silty sand	SM	100.0	99.9	99.4	91.4	44.4	20.5	17.6	12.9
	S-18	45-46.5	Tan sand	SP	100.0	100.0	100.0	93.0	31.4	12.6	10.0	4.9
	S-19	47.5-49	Tan sand with silt	SP-SM	100.0	100.0	99.8	90.8	17.1	7.8	6.9	5.4
	S-20	50-51.5	Tan and gray clay with sand	CH	97.6	96.2	95.4	94.4	90.9	87.1	84.7	77.0
	S-21	52.5-54.5	Light gray and tan clay	CH	100.0	99.8	99.3	99.2	99.1	98.6	98.2	96.6
	S-22	55-56.5	Light gray and tan clay	CH	100.0	100.0	100.0	99.9	99.3	98.9	98.7	97.6
	S-23	57.5-59.5	Tan and gray silty sand	SM	100.0	99.9	99.7	99.4	99.0	98.9	97.7	19.9
	S-24	60-61.5	Light gray and tan clay with sand	CH	100.0	99.8	99.1	98.5	98.0	97.1	95.7	85.0
8A2S-TEMF-6	S-1	2.5-4.5	Reddish brown and light gray clay	CH	100.0	99.9	99.8	99.7	99.4	98.7	98.3	96.2
	S-2	5-6.5	Reddish brown and tan clay with sand	CH	100.0	99.9	99.7	99.6	99.4	98.0	95.6	72.1
	S-3	7.5-9.5	Tan and gray clayey sand	SC	100.0	100.0	100.0	100.0	99.9	98.3	91.7	45.2
	S-4	10-11.5	Tan clay with sand	CL	100.0	100.0	100.0	100.0	99.9	99.2	98.1	82.3
8A2S-TEMF-7	S-1	2.5-4.5	Reddish brown and tan clayey sand	SC	97.3	96.0	95.2	92.4	82.0	59.1	50.2	33.6
	S-2	5-6.5	Reddish brown sandy clay	CL	100.0	100.0	100.0	99.8	97.1	90.9	84.2	50.6
	S-3	7.5-9.5	Tan and gray silty sand	SM	100.0	99.8	99.8	99.7	99.4	89.7	76.3	32.4
	S-4	10-11.5	Tan clayey sand	SC	100.0	100.0	100.0	99.8	99.4	96.6	92.0	45.4
10A2S-TEMF-8	S-1	2.5-4	Tan and dark brown silty sand	SM	99.8	99.7	99.5	98.9	91.9	74.6	66.5	44.1
	S-2	5-6.5	Tan and gray clayey sand	SC	99.5	99.2	98.9	98.6	91.6	74.3	66.8	47.0
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	---	---	---	---	---	---	---	---
	S-4	10-11.3	Reddish brown and gray sandy clay	CL	---	---	---	---	---	---	---	---



SUMMARY OF LABORATORY TEST RESULTS											
LABORATORY TESTING SERVICES UNIT OPERATIONS FACILITIES FORT POLK, LOUISIANA											
Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Percent Passing Sieve						
					#4	#10	#20	#40	#60	#80	#100 #200
8A2S-TEMF-10	S-1	2.5-4	Reddish brown sandy clay	CH	97.5	96.0	94.9	95.7	88.5	79.2	72.2 52.1
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	98.8	98.0	97.7	97.2	95.0	87.2	80.7 55.3
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	---	---	---	---	---	---	---
	S-4	10-11.5	Reddish brown and gray sandy clay	CL	---	---	---	---	---	---	---
8A2S-COF-13	S-1	2.5-4.5	Reddish brown sandy clay	CH	100.0	99.9	99.7	99.6	98.5	89.2	82.3 52.3
	S-2	5-6.5	Reddish brown clayey sand	SC	99.9	99.1	98.8	98.5	92.1	70.7	63.8 38.3
	S-3	7.5-9.5	Brown and tan silty sand	SM	100.0	99.6	99.3	99.1	90.7	62.6	54.9 24.4
	S-4	10-11.5	Tan sand with silt	SP-SM	100.0	100.0	100.0	99.9	73.9	35.1	24.4 11.4
10A2S-COF-16	S-1	2.5-4	Reddish brown sandy clay	CH	100.0	100.0	99.9	99.8	99.2	97.2	94.7 56.9
	S-2	5-6.5	Reddish brown clayey sand	SC	100.0	100.0	100.0	99.9	98.7	91.2	84.5 46.6
	S-3	7.5-9	Reddish brown clayey sand	SC	---	---	---	---	---	---	---
	S-4	10-11.5	Tan and gray silty sand	SM	---	---	---	---	---	---	---
8A2S-COF-17	S-1	2.5-4.5	Reddish brown and tan sandy clay	CL	99.2	98.7	98.5	98.2	95.6	87.6	81.1 55.2
	S-2	5-6.5	Reddish brown clay with sand	CH	100.0	99.8	99.7	99.5	98.6	94.8	90.5 71.1
	S-3	7.5-9.5	Reddish brown and tan sandy clay	CL	99.1	98.7	98.6	98.6	97.7	87.8	81.1 54.2
	S-4	10-11.5	Reddish brown silty sand	SM	100.0	100.0	100.0	100.0	99.1	80.7	60.3 22.0
8A2S-COF-18	S-1	2.5-4.5	Reddish brown and tan sandy clay	CH	100.0	100.0	100.0	99.9	99.4	95.3	88.4 54.6
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	100.0	100.0	99.9	99.8	99.5	95.3	90.8 56.5
	S-3	7.5-9.5	Tan and brown silty sand	SM	100.0	100.0	100.0	99.9	98.6	86.2	70.5 19.7
	S-4	10-11.5	Tan silty sand	SM	100.0	100.0	100.0	99.8	90.2	63.0	40.8 12.1
	S-6	15-16.5	Tan and gray sand with silt	SP-SM	100.0	100.0	100.0	100.0	98.5	73.7	45.3 10.5
	S-7	17.5-19	Tan sand with silt	SP-SM	100.0	100.0	100.0	100.0	93.7	48.9	28.4 8.9
	S-8	20-21.5	Tan sand with silt	SP-SM	100.0	100.0	100.0	100.0	90.4	41.0	25.9 9.1
	S-9	22.5-24	Tan sand with silt	SP-SM	100.0	100.0	100.0	99.9	90.6	28.6	16.4 7.5
8A2S-COF-21	S-1	2.5-4.5	Tan and brown silty sand	SM	100.0	100.0	100.0	99.8	96.2	73.1	56.6 23.0
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	99.9	99.8	99.4	99.1	97.5	91.4	86.5 61.4
	S-3	7.5-9.5	Tan and brown silty sand	SM	100.0	100.0	100.0	99.4	80.9	43.2	32.2 14.1
	S-4	10-11.5	Tan and brown silty sand	SM	100.0	100.0	100.0	99.6	91.5	58.6	44.9 17.8
8A2S-TEMF-22	S-1	2.5-4.0	Reddish brown and tan silty sand	SM	97.5	95.2	92.7	80.0	52.6	37.0	33.0 22.2
	S-1	4.0-4.5	Reddish brown and tan clay	CH	100.0	99.9	99.8	99.6	99.6	99.1	98.5 92.1
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	100.0	100.0	100.0	100.0	99.8	98.7	96.9 79.4
	S-3	7.5-9.5	Tan and brown silty sand	SM	99.9	99.7	99.5	99.3	98.6	89.9	79.8 38.7
	S-4	10-11.5	Tan and brown silty sand	SM	100.0	100.0	100.0	100.0	99.5	85.9	68.2 21.4

SUMMARY OF LABORATORY TEST RESULTS									
LABORATORY TESTING SERVICES UNIT OPERATIONS FACILITIES FORT POLK, LOUISIANA									
Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Moisture Content (%)	Unit Dry Weight (pcf)	Atterberg Limits		
							LL	PL	PI
									Notes
10A2S-TEMF-1	S-1	2.5-4	Tan silty sand	SM	6.7	---	Non-Plastic		
	S-2	5-6.5	Tan sandy clay	CL	11.8	---	33	18	15
	S-3	7.5-9	Tan silty sand	SM	7.9	---	---	---	---
	S-4	10-11.3	Tan clayey sand	SC	13.1	---	---	---	---
8A2S-TEMF-4	S-1	2.5-4.5	Tan and brown silty sand	SM	6.8	99.5	Non-Plastic		
	S-2	5-6.5	Tan and reddish brown sandy clay	CL	12.8	---	31	17	14
	S-3	7.5-9.5	Tan and brown sandy clay	CL	13.7	105.2	34	16	18
	S-4	10-11.5	Tan silty sand	SM	9.5	---	Non-Plastic		
	S-5	12.5-14	Tan silty sand	SM	13.4	---	Non-Plastic		
	S-7	17.5-19	Tan sand with silt	SP-SM	17.3	---	Non-Plastic		
	S-8	20-21.5	Tan silty sand	SM	26.1	---	Non-Plastic		
	S-10	25-26.5	Tan sand with silt	SP-SM	24.0	---	Non-Plastic		
	S-11	27.5-29	Tan sand with silt	SP-SM	22.4	---	Non-Plastic		
	S-12	30-31.5	Tan sand with silt	SP-SM	21.1	---	Non-Plastic		
	S-14	35-36.5	Tan clayey sand	SC	22.7	---	31	15	16
	S-16	40-41.5	Tan silty sand	SM	23.9	---	Non-Plastic		
	S-18	45-46.5	Tan sand	SP	21.2	---	Non-Plastic		
	S-19	47.5-49	Tan sand with silt	SP-SM	24.7	---	Non-Plastic		
	S-20	50-51.5	Tan and gray clay with sand	CH	23.4	---	69	18	51
	S-21	52.5-54.5	Light gray and tan clay	CH	42.8	78.1	114	36	78
	S-22	55-56.5	Light gray and tan clay	CH	41.7	---	96	31	65
	S-23	57.5-59.5	Tan and gray silty sand	SM	28.7	99.0	Non-Plastic		
	S-24	60-61.5	Light gray and tan clay with sand	CH	32.9	---	107	30	77
8A2S-TEMF-6	S-1	2.5-4.5	Reddish brown and light gray clay	CH	24.7	---	81	21	60
	S-2	5-6.5	Reddish brown and tan clay with sand	CH	21.5	---	56	19	37
	S-3	7.5-9.5	Tan and gray clayey sand	SC	17.2	---	34	20	14
	S-4	10-11.5	Tan clay with sand	CL	19.8	---	46	19	27
8A2S-TEMF-7	S-1	2.5-4.5	Reddish brown and tan clayey sand	SC	11.1	---	26	16	10
	S-2	5-6.5	Reddish brown sandy clay	CL	12.8	---	41	12	29
	S-3	7.5-9.5	Tan and gray silty sand	SM	9.4	---	Non-Plastic		
	S-4	10-11.5	Tan clayey sand	SC	11.9	---	34	19	15
10A2S-TEMF-8	S-1	2.5-4	Tan and dark brown silty sand	SM	11.5	---	Non-Plastic		
	S-2	5-6.5	Tan and gray clayey sand	SC	14.1	---	32	18	14
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	18.2	---	---	---	---
	S-4	10-11.3	Reddish brown and gray sandy clay	CL	17.1	---	---	---	---
* See attached "Laboratory Test Data Sheets" for Consolidation Test Results									

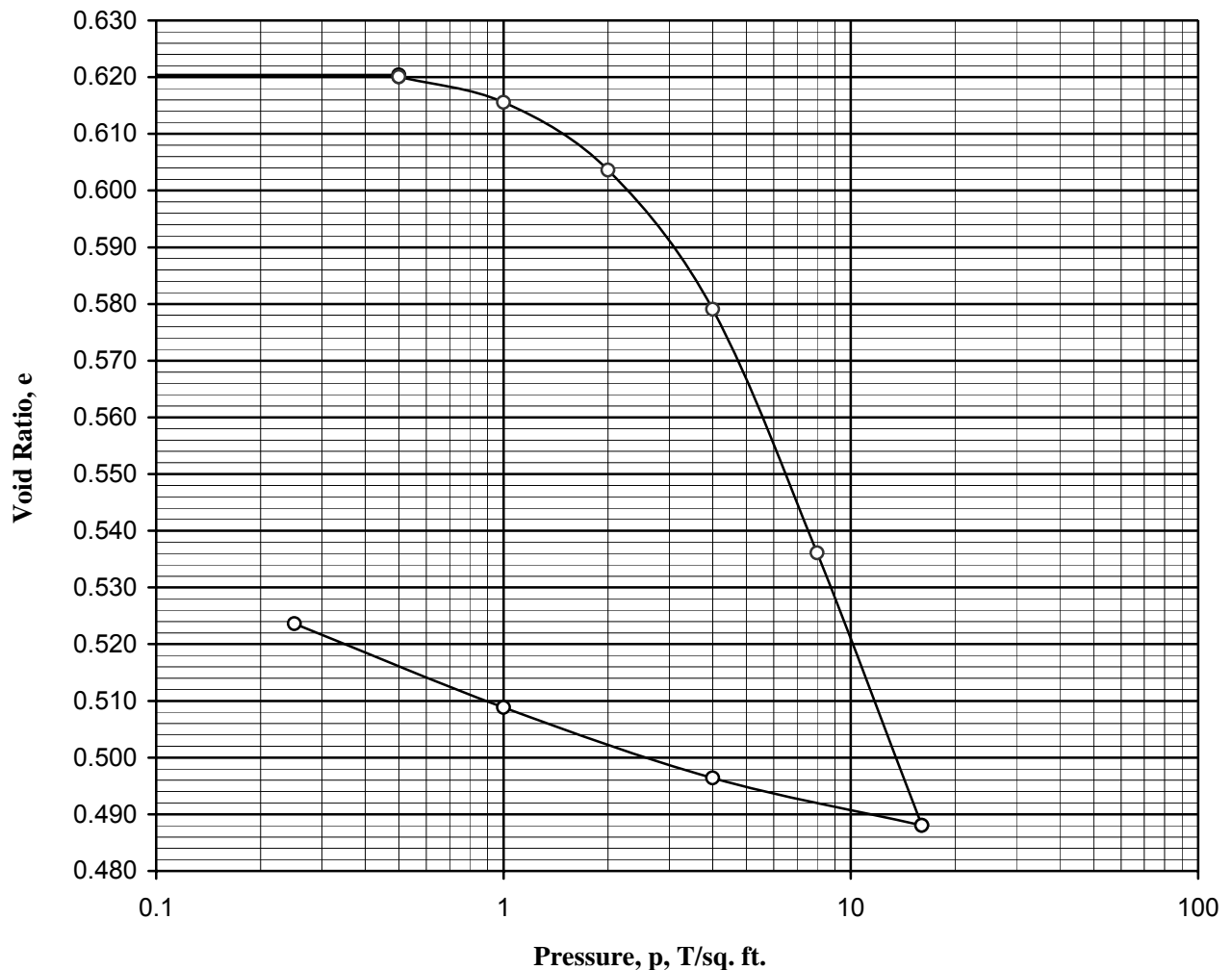
SUMMARY OF LABORATORY TEST RESULTS										
LABORATORY TESTING SERVICES UNIT OPERATIONS FACILITIES FORT POLK, LOUISIANA										
Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Moisture Content (%)	Unit Dry Weight (pcf)	Atterberg Limits			Notes
							LL	PL	PI	
8A2S-TEMF-10	S-1	2.5-4	Reddish brown sandy clay	CH	15.9	---	51	16	35	
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	15.4	---	42	16	26	
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	17.3	---	---	---	---	
	S-4	10-11.5	Reddish brown and gray sandy clay	CL	17.9	---	---	---	---	
8A2S-COF-13	S-1	2.5-4.5	Reddish brown sandy clay	CH	17.0	---	51	19	32	
	S-2	5-6.5	Reddish brown clayey sand	SC	14.0	---	27	19	8	
	S-3	7.5-9.5	Brown and tan silty sand	SM	14.0	---	Non-Plastic			
	S-4	10-11.5	Tan sand with silt	SP-SM	7.8	---	Non-Plastic			
10A2S-COF-16	S-1	2.5-4	Reddish brown sandy clay	CH	18.1	---	52	20	32	
	S-2	5-6.5	Reddish brown clayey sand	SC	14.9	---	29	20	9	
	S-3	7.5-9	Reddish brown clayey sand	SC	12.8	---	---	---	---	
	S-4	10-11.5	Tan and gray silty sand	SM	9.4	---	---	---	---	
8A2S-COF-17	S-1	2.5-4.5	Reddish brown and tan sandy clay	CL	13.1	---	30	17	13	
	S-2	5-6.5	Reddish brown clay with sand	CH	17.8	---	64	20	44	
	S-3	7.5-9.5	Reddish brown and tan sandy clay	CL	17.5	---	49	17	32	
	S-4	10-11.5	Reddish brown silty sand	SM	7.4	---	Non-Plastic			
8A2S-COF-18	S-1	2.5-4.5	Reddish brown and tan sandy clay	CH	19.1	105.6	53	20	33	*
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	18.4	---	32	20	12	
	S-3	7.5-9.5	Tan and brown silty sand	SM	14.8	---	Non-Plastic			
	S-4	10-11.5	Tan silty sand	SM	7.1	---	Non-Plastic			
	S-6	15-16.5	Tan and gray sand with silt	SP-SM	15.6	---	Non-Plastic			
	S-7	17.5-19	Tan sand with silt	SP-SM	27.5	---	Non-Plastic			
	S-8	20-21.5	Tan sand with silt	SP-SM	25.3	---	Non-Plastic			
	S-9	22.5-24	Tan sand with silt	SP-SM	25.7	---	Non-Plastic			
8A2S-COF-21	S-1	2.5-4.5	Tan and brown silty sand	SM	8.1	---	Non-Plastic			
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	12.6	---	46	17	29	
	S-3	7.5-9.5	Tan and brown silty sand	SM	5.2	---	Non-Plastic			
	S-4	10-11.5	Tan and brown silty sand	SM	6.0	---	Non-Plastic			
8A2S-TEMF-22	S-1	2.5-4.0	Reddish brown and tan silty sand	SM	10.2	---	Non-Plastic			
	S-1	4.0-4.5	Reddish brown and tan clay	CH	20.3	---	64	16	48	
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	17.0	---	39	17	22	
	S-3	7.5-9.5	Tan and brown silty sand	SM	10.2	---	Non-Plastic			
	S-4	10-11.5	Tan and brown silty sand	SM	6.1	---	Non-Plastic			
* See attached "Laboratory Test Data Sheets" for Consolidation Test Results										

SUMMARY OF LABORATORY TEST RESULTS										
LABORATORY TESTING SERVICES UNIT OPERATIONS FACILITIES FORT POLK, LOUISIANA										
Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)	Moisture Content (%)	Unit Weight (pcf)	Dry Pressure (tsf)	Confining Pressure (tsf)	Strain @ Failure (%)	Type Failure	
10A2S-TEMF-1	S-1	2.5-4	Tan silty sand	SM	6.7	---	---	---		
	S-2	5-6.5	Tan sandy clay	CL	11.8	---	---	---		
	S-3	7.5-9	Tan silty sand	SM	7.9	---	---	---		
	S-4	10-11.3	Tan clayey sand	SC	13.1	---	---	---		
8A2S-TEMF-4	S-1	2.5-4.5	Tan and brown silty sand	SM	6.8	99.5	0.219	1.380	2.7	Internal
	S-2	5-6.5	Tan and reddish brown sandy clay	CL	12.8	---	---	---	---	
	S-3	7.5-9.5	Tan and brown sandy clay	CL	13.7	105.2	0.531	2.090	6.4	Internal
	S-4	10-11.5	Tan silty sand	SM	9.5	---	---	---	---	
	S-5	12.5-14	Tan silty sand	SM	13.4	---	---	---	---	
	S-7	17.5-19	Tan sand with silt	SP-SM	17.3	---	---	---	---	
	S-8	20-21.5	Tan silty sand	SM	26.1	---	---	---	---	
	S-10	25-26.5	Tan sand with silt	SP-SM	24.0	---	---	---	---	
	S-11	27.5-29	Tan sand with silt	SP-SM	22.4	---	---	---	---	
	S-12	30-31.5	Tan sand with silt	SP-SM	21.1	---	---	---	---	
	S-14	35-36.5	Tan clayey sand	SC	22.7	---	---	---	---	
	S-16	40-41.5	Tan silty sand	SM	23.9	---	---	---	---	
	S-18	45-46.5	Tan sand	SP	21.2	---	---	---	---	
	S-19	47.5-49	Tan sand with silt	SP-SM	24.7	---	---	---	---	
	S-20	50-51.5	Tan and gray clay with sand	CH	23.4	---	---	---	---	
	S-21	52.5-54.5	Light gray and tan clay	CH	42.8	78.1	3.344	1.910	2.9	Angular (60°)
	S-22	55-56.5	Light gray and tan clay	CH	41.7	---	---	---	---	
	S-23	57.5-59.5	Tan and gray silty sand	SM	28.7	99.0	3.656	6.260	13.9	Internal
	S-24	60-61.5	Light gray and tan clay with sand	CH	32.9	---	---	---	---	
8A2S-TEMF-6	S-1	2.5-4.5	Reddish brown and light gray clay	CH	24.7	---	---	---	---	
	S-2	5-6.5	Reddish brown and tan clay with sand	CH	21.5	---	---	---	---	
	S-3	7.5-9.5	Tan and gray clayey sand	SC	17.2	---	---	---	---	
	S-4	10-11.5	Tan clay with sand	CL	19.8	---	---	---	---	
8A2S-TEMF-7	S-1	2.5-4.5	Reddish brown and tan clayey sand	SC	11.1	---	---	---	---	
	S-2	5-6.5	Reddish brown sandy clay	CL	12.8	---	---	---	---	
	S-3	7.5-9.5	Tan and gray silty sand	SM	9.4	---	---	---	---	
	S-4	10-11.5	Tan clayey sand	SC	11.9	---	---	---	---	
10A2S-TEMF-8	S-1	2.5-4	Tan and dark brown silty sand	SM	11.5	---	---	---	---	
	S-2	5-6.5	Tan and gray clayey sand	SC	14.1	---	---	---	---	
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	18.2	---	---	---	---	
	S-4	10-11.3	Reddish brown and gray sandy clay	CL	17.1	---	---	---	---	

SUMMARY OF LABORATORY TEST RESULTS										
LABORATORY TESTING SERVICES UNIT OPERATIONS FACILITIES FORT POLK, LOUISIANA										
Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Moisture Content (%)	Unit Dry Weight (pcf)	Confining Pressure (tsf)	Q (tsf)	Strain @ Failure (%)	Type Failure
8A2S-TEMF-10	S-1	2.5-4	Reddish brown sandy clay	CH	15.9	---	---	---	---	
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	15.4	---	---	---	---	
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	17.3	---	---	---	---	
	S-4	10-11.5	Reddish brown and gray sandy clay	CL	17.9	---	---	---	---	
8A2S-COF-13	S-1	2.5-4.5	Reddish brown sandy clay	CH	17.0	---	---	---	---	
	S-2	5-6.5	Reddish brown clayey sand	SC	14.0	---	---	---	---	
	S-3	7.5-9.5	Brown and tan silty sand	SM	14.0	---	---	---	---	
	S-4	10-11.5	Tan sand with silt	SP-SM	7.8	---	---	---	---	
10A2S-COF-16	S-1	2.5-4	Reddish brown sandy clay	CH	18.1	---	---	---	---	
	S-2	5-6.5	Reddish brown clayey sand	SC	14.9	---	---	---	---	
	S-3	7.5-9	Reddish brown clayey sand	SC	12.8	---	---	---	---	
	S-4	10-11.5	Tan and gray silty sand	SM	9.4	---	---	---	---	
8A2S-COF-17	S-1	2.5-4.5	Reddish brown and tan sandy clay	CL	13.1	---	---	---	---	
	S-2	5-6.5	Reddish brown clay with sand	CH	17.8	---	---	---	---	
	S-3	7.5-9.5	Reddish brown and tan sandy clay	CL	17.5	---	---	---	---	
	S-4	10-11.5	Reddish brown silty sand	SM	7.4	---	---	---	---	
8A2S-COF-18	S-1	2.5-4.5	Reddish brown and tan sandy clay	CH	19.1	105.6	0.219	2.120	15.0	Angular (75 <sup>0</sup> Slickensided)
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	18.4	---	---	---	---	
	S-3	7.5-9.5	Tan and brown silty sand	SM	14.8	---	---	---	---	
	S-4	10-11.5	Tan silty sand	SM	7.1	---	---	---	---	
	S-6	15-16.5	Tan and gray sand with silt	SP-SM	15.6	---	---	---	---	
	S-7	17.5-19	Tan sand with silt	SP-SM	27.5	---	---	---	---	
	S-8	20-21.5	Tan sand with silt	SP-SM	25.3	---	---	---	---	
	S-9	22.5-24	Tan sand with silt	SP-SM	25.7	---	---	---	---	
8A2S-COF-21	S-1	2.5-4.5	Tan and brown silty sand	SM	8.1	---	---	---	---	
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	12.6	---	---	---	---	
	S-3	7.5-9.5	Tan and brown silty sand	SM	5.2	---	---	---	---	
	S-4	10-11.5	Tan and brown silty sand	SM	6.0	---	---	---	---	
8A2S-TEMF-22	S-1	2.5-4.0	Reddish brown and tan silty sand	SM	10.2	---	---	---	---	
	S-1	4.0-4.5	Reddish brown and tan clay	CH	20.3	---	---	---	---	
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	17.0	---	---	---	---	
	S-3	7.5-9.5	Tan and brown silty sand	SM	10.2	---	---	---	---	
	S-4	10-11.5	Tan and brown silty sand	SM	6.1	---	---	---	---	

# TEAM Consultants, Inc.

## Geotechnical, Environmental, Construction Materials Testing

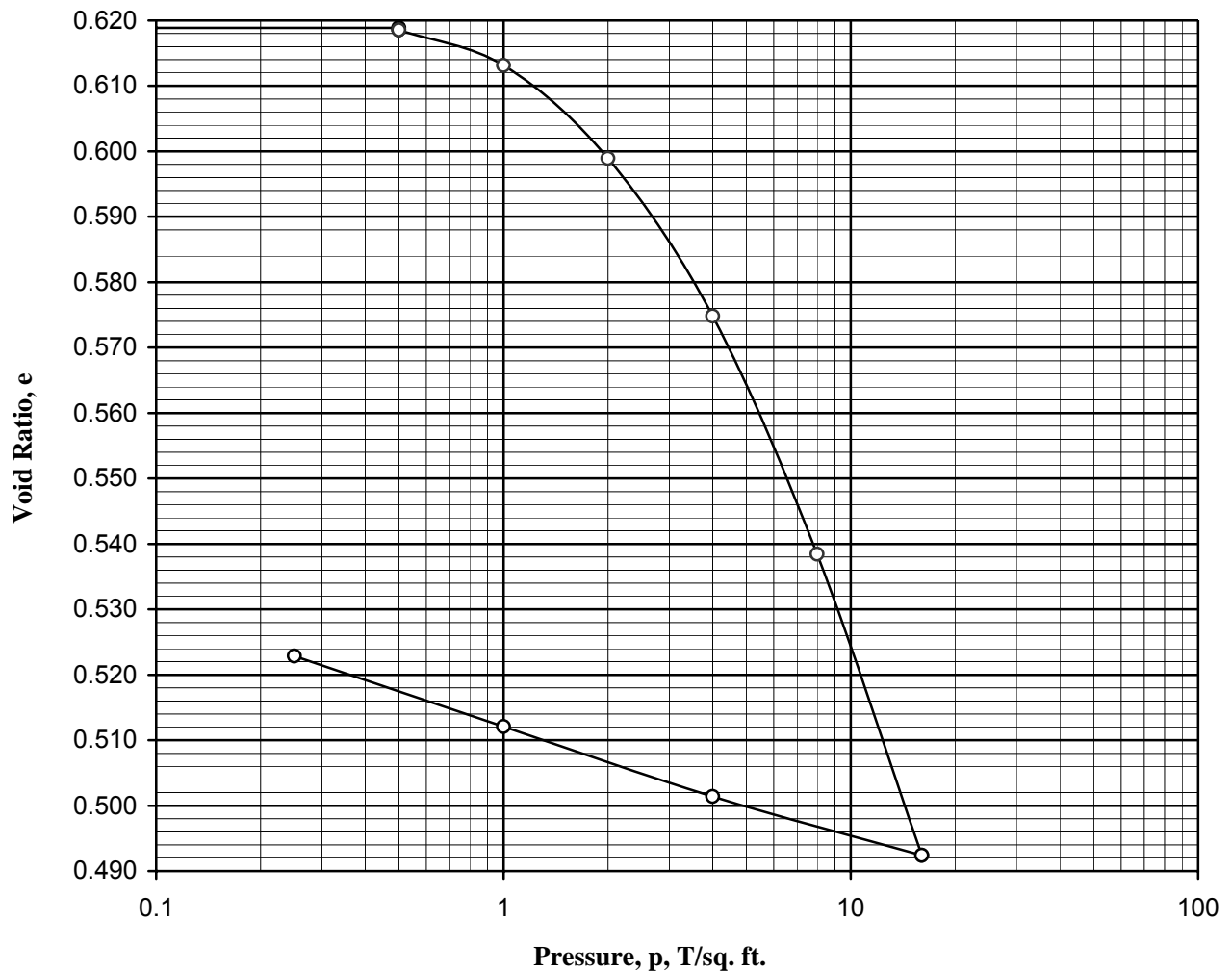


Type of specimen:	Undisturbed	Before Test		After Test	
Diam. 2.50 in.	Ht. 0.494 in.	Water Content, $w_o$	13.68%	$W_f$	17.46%
Overburden Pressure, $P_o$	T/sq. ft.	Void Ratio, $e_o$	0.6204	$e_f$	0.5236
Preconsol. Pressure, $P_c$	T/sq. ft.	Saturation, $S_o$	60.2%	$S_f$	91.0%
Compression Index, $C_c$		Dry Density, $\gamma_d$	105.2 lb/ft <sup>3</sup>		
Classification	Tan and brown sandy clay				
LL 34	$G_s$ 2.731	Project Fort Polk UOF			
PL 16					
Remarks		Team Project No.: 102040			
		Boring No: 8A2S-TEMF-4		Sample No.: S-3	
		Depth: 7.5-9.5		Date: 6/30/10	
		CONSOLIDATION TEST REPORT			

Friday, April 29, 2011

# TEAM Consultants, Inc.

## Geotechnical, Environmental, Construction Materials Testing



Type of specimen:		Undisturbed	Before Test		After Test			
Diam.	2.50 in.	Ht.	0.494 in.	Water Content, $w_o$	19.12%	$W_f$	18.25%	
Overburden Pressure, $P_o$				T/sq. ft.	Void Ratio, $e_o$	0.6189	$e_f$	0.5229
Preconsol. Pressure, $P_c$				T/sq. ft.	Saturation, $S_o$	84.6%	$S_f$	95.6%
Compression Index, $C_c$				Dry Density, $\gamma_d$	105.6 lb/ft <sup>3</sup>			
Classification Reddish brown and tan sandy clay								
LL	53	$G_s$	2.739	Project Fort Polk UOF				
PL	20							
Remarks				Team Project No.: 102040				
				Boring No: 8A2S-COF-18		Sample No.: S-1		
				Depth: 2.5-4.5		Date: 6/30/10		
				CONSOLIDATION TEST REPORT				

Friday, April 29, 2011

## **APPENDIX D**

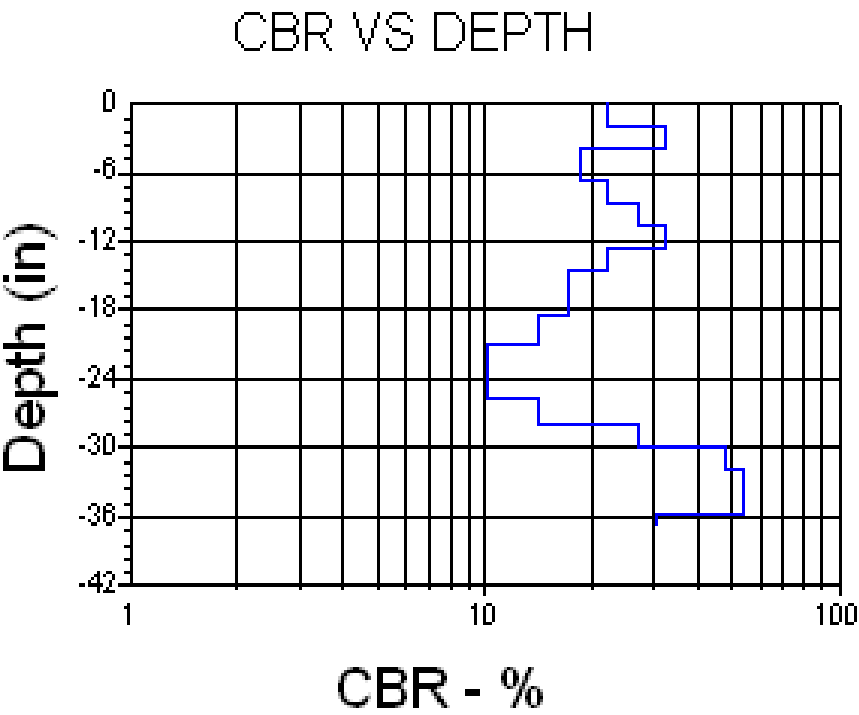
### **DYNAMIC CONE PENETROMETER (DCP) TESTING DATA PLOTS**



DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-01

Date: 21 May 2010  
Station: 10A2S-TEMF-01

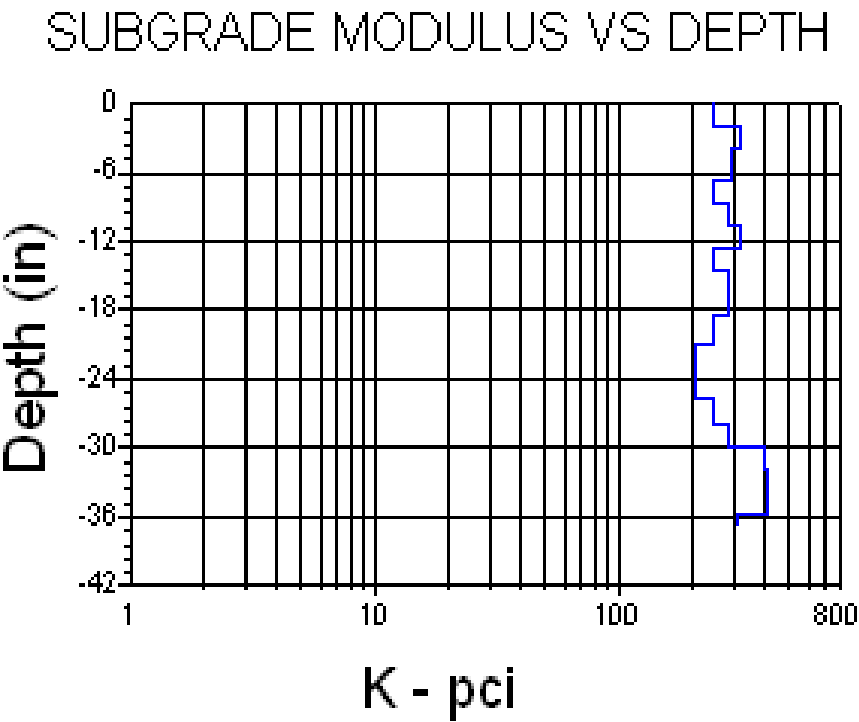


(MM)	TEST PROFILE	(IN)
0	SUBGRADE 6.00" CBR 26	0
127	UNASSIGNED 6.00" CBR 25	5
254	UNASSIGNED 6.00" CBR 21	10
381	UNASSIGNED 6.00" CBR 13	15
508	UNASSIGNED 6.00" CBR 13	20
635	UNASSIGNED 6.00" CBR 13	25
762	UNASSIGNED 13.25" CBR 36	30
889		35
1016		40
1143		45
1270		50

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-01

Date: 21 May 2010  
Station: 10A2S-TEMF-01

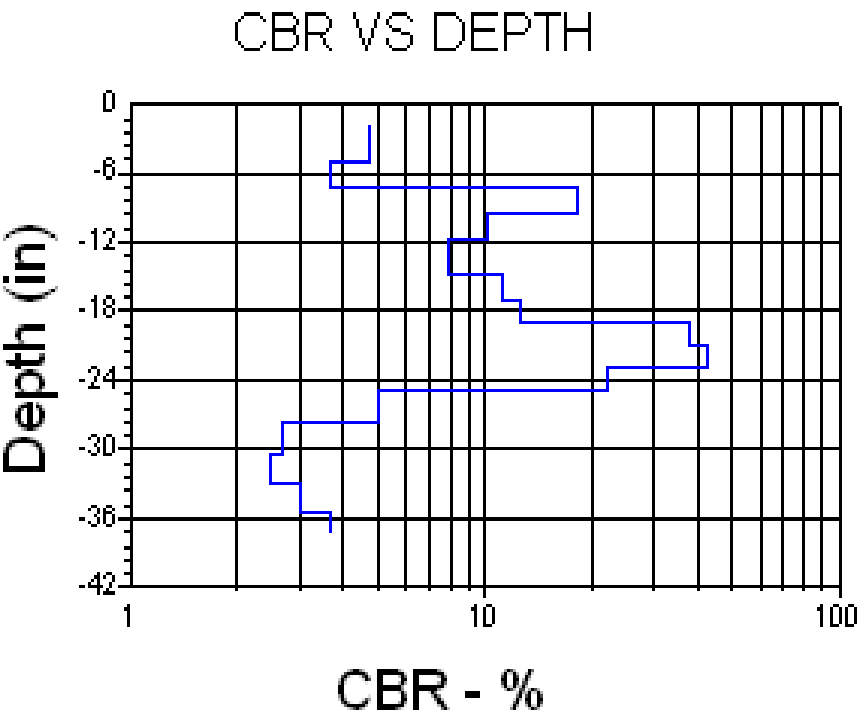


(MM)	TEST PROFILE	(IN)
0		0
127	SUBGRADE 6.00" K 283	
254	UNASSIGNED 6.00" K 277	5
381	UNASSIGNED 6.00" K 273	10
508	UNASSIGNED 6.00" K 230	15
635		20
762	UNASSIGNED 13.25" K 331	25
889		30
1016		35
1143		40
1270		45
		50

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-02

Date: 21 May 2010  
Station: 10A2S-TEMF-02

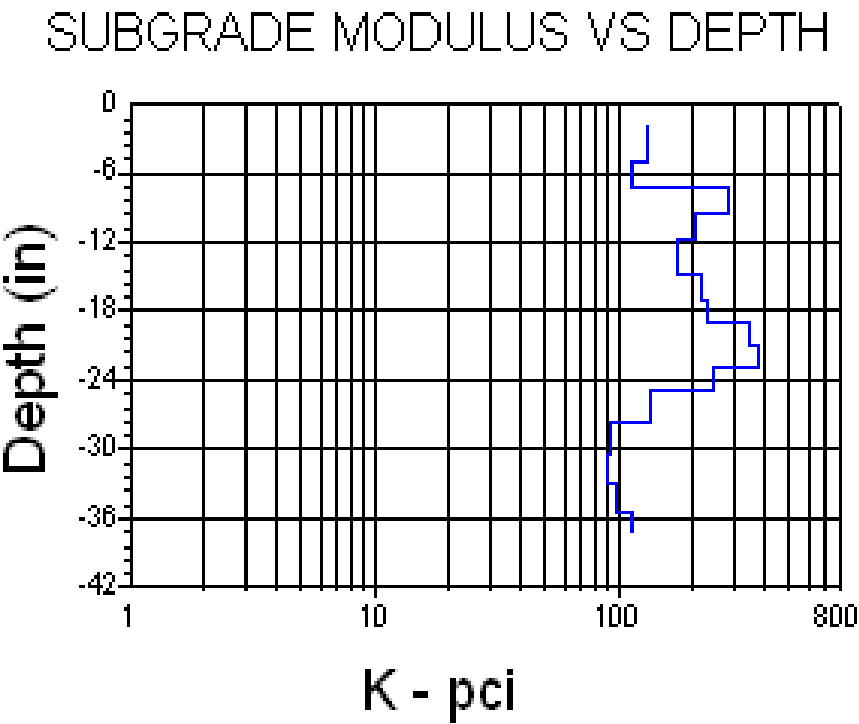


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.75"	
127	UNASSIGNED 4.25" CBR 4	0
254	UNASSIGNED 6.00" CBR 11	5
381	UNASSIGNED 6.00" CBR 11	10
508	UNASSIGNED 6.00" CBR 33	15
635		20
762	UNASSIGNED 13.50" CBR 5	25
889		30
1016		35
1143		40
1270		45

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-02

Date: 21 May 2010  
Station: 10A2S-TEMF-02

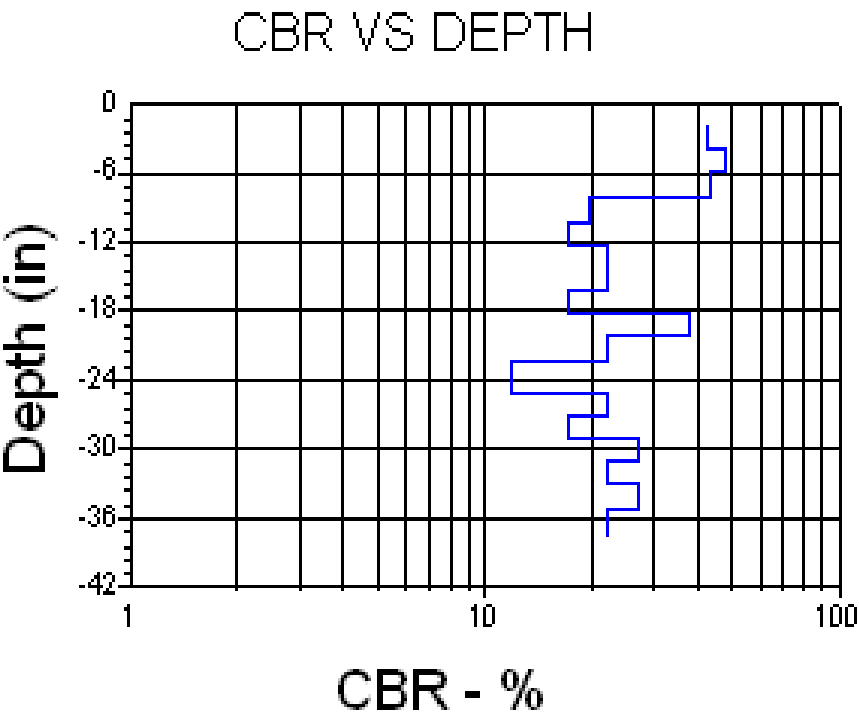


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.75"	
127	SUBGRADE 4.25" K 124	0
254	UNASSIGNED 6.00" K 211	5
381	UNASSIGNED 6.00" K 208	10
508	UNASSIGNED 6.00" K 317	15
635		20
762	UNASSIGNED 13.50" K 119	25
889		30
1016		35
1143		40
1270		45

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-03

Date: 21 May 2010  
Station: 10A2S-TEMF-03

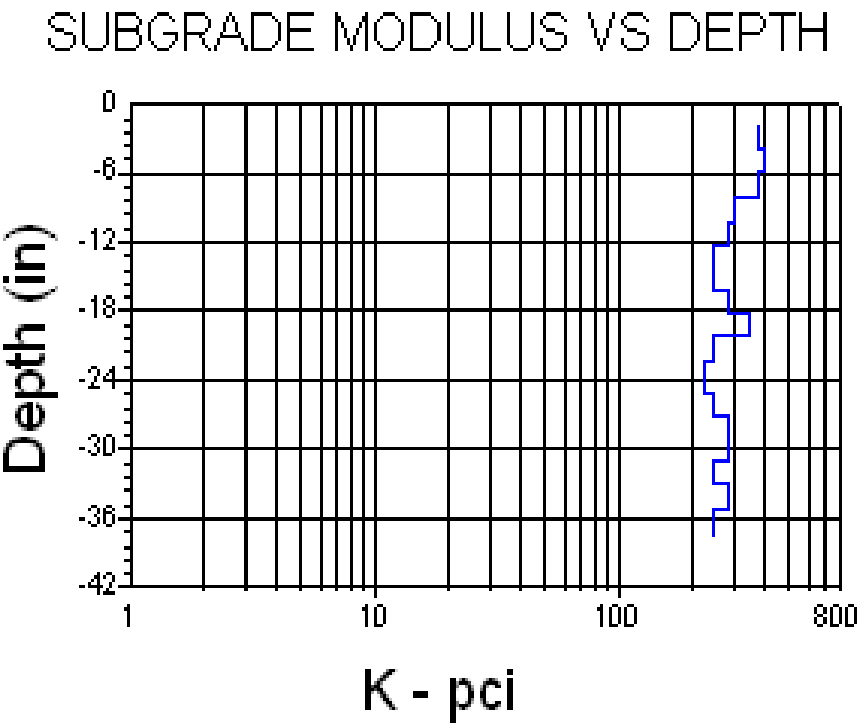


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.75"	0
127	SUBGRADE 4.25" CBR 45	5
254	UNASSIGNED 6.00" CBR 25	10
381	UNASSIGNED 6.00" CBR 21	15
508	UNASSIGNED 6.00" CBR 25	20
635		25
762	UNASSIGNED 14.00" CBR 22	30
889		35
1016		40
1143		45
1270		50

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-03

Date: 21 May 2010  
Station: 10A2S-TEMF-03

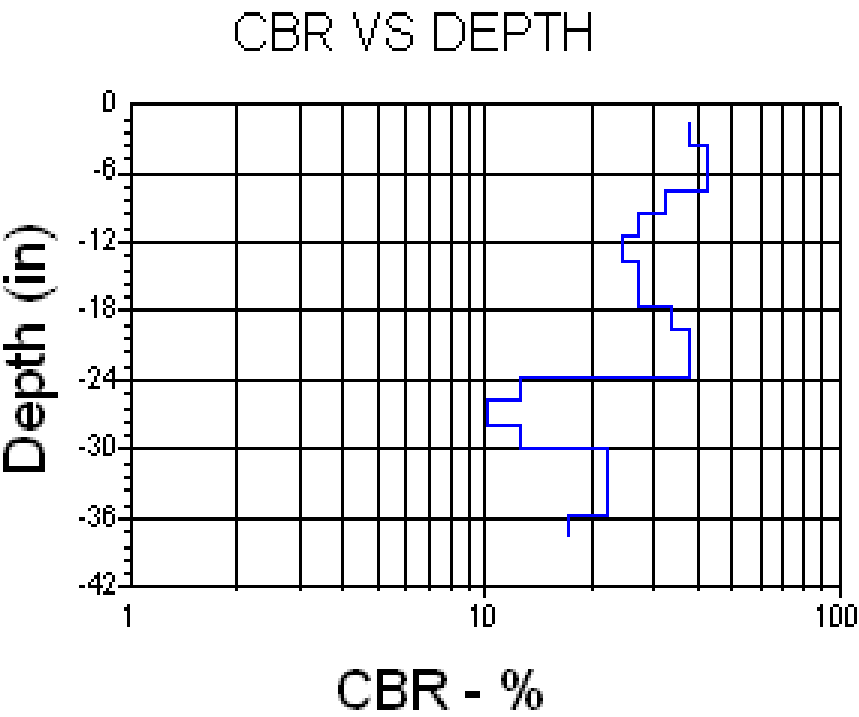


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.75"	
127	SUBGRADE 4.25" K 379	0
254	UNASSIGNED 6.00" K 313	5
381	UNASSIGNED 6.00" K 256	10
508	UNASSIGNED 6.00" K 280	15
635		20
762	UNASSIGNED 14.00" K 260	25
889		30
1016		35
1143		40
1270		45

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-05

Date: 21 May 2010  
Station: 10A2S-TEMF-05

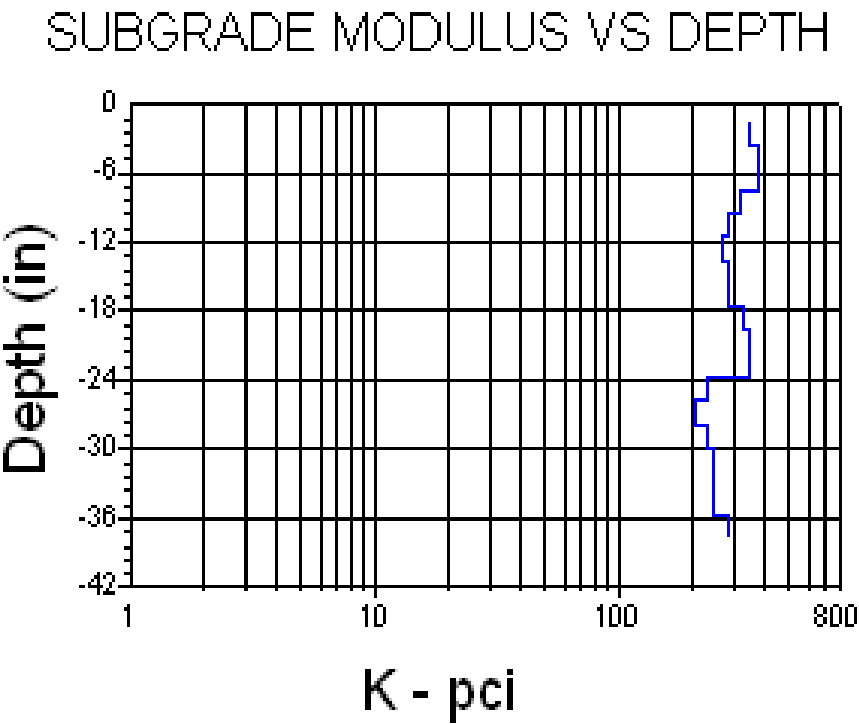


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" CBR 41	0
254	UNASSIGNED 6.00" CBR 31	5
381	UNASSIGNED 6.00" CBR 28	10
508	UNASSIGNED 6.00" CBR 33	15
635		20
762	UNASSIGNED 14.00" CBR 17	25
889		30
1016		35
1143		40
1270		45

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-05

Date: 21 May 2010  
Station: 10A2S-TEMF-05



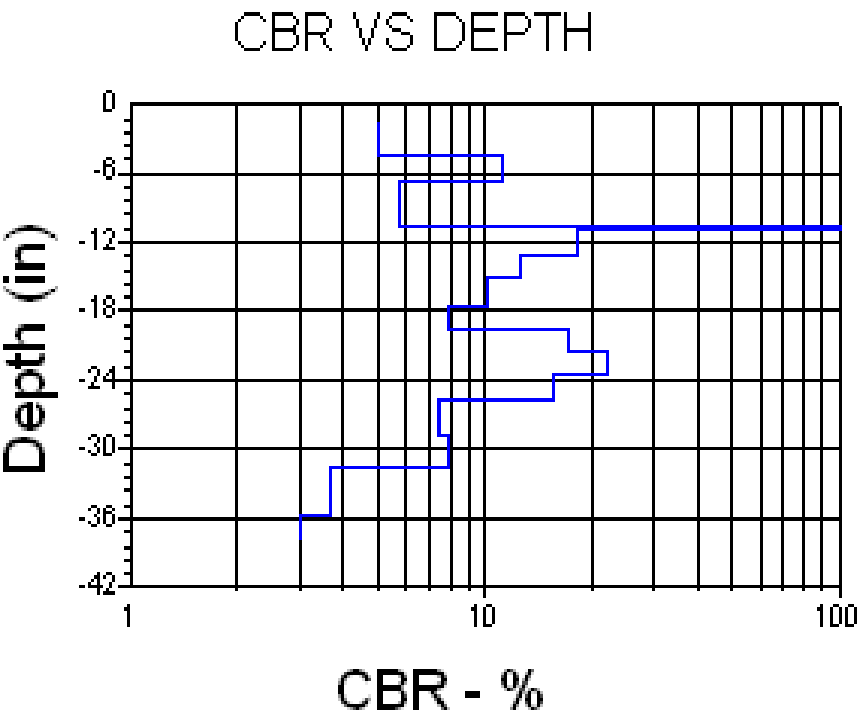
(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" K 360	0
254	UNASSIGNED 6.00" K 305	5
381	UNASSIGNED 6.00" K 287	10
508	UNASSIGNED 6.00" K 322	15
635		20
762	UNASSIGNED 14.00" K 240	25
889		30
1016		35
1143		40
1270		45



DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-08

Date: 21 May 2010  
Station: 10A2S-TEMF-08

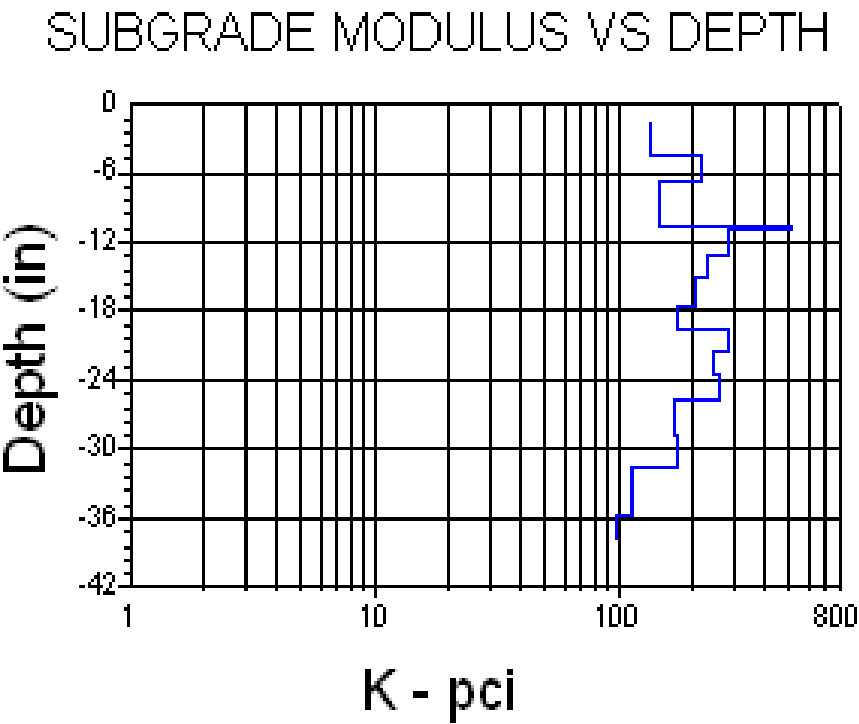


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" CBR 7	0
254	UNASSIGNED 6.00" CBR 40	5
381	UNASSIGNED 6.00" CBR 12	10
508	UNASSIGNED 6.00" CBR 17	15
635		20
762	UNASSIGNED 14.00" CBR 7	25
889		30
1016		35
1143		40
1270		45
		50

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-08

Date: 21 May 2010  
Station: 10A2S-TEMF-08

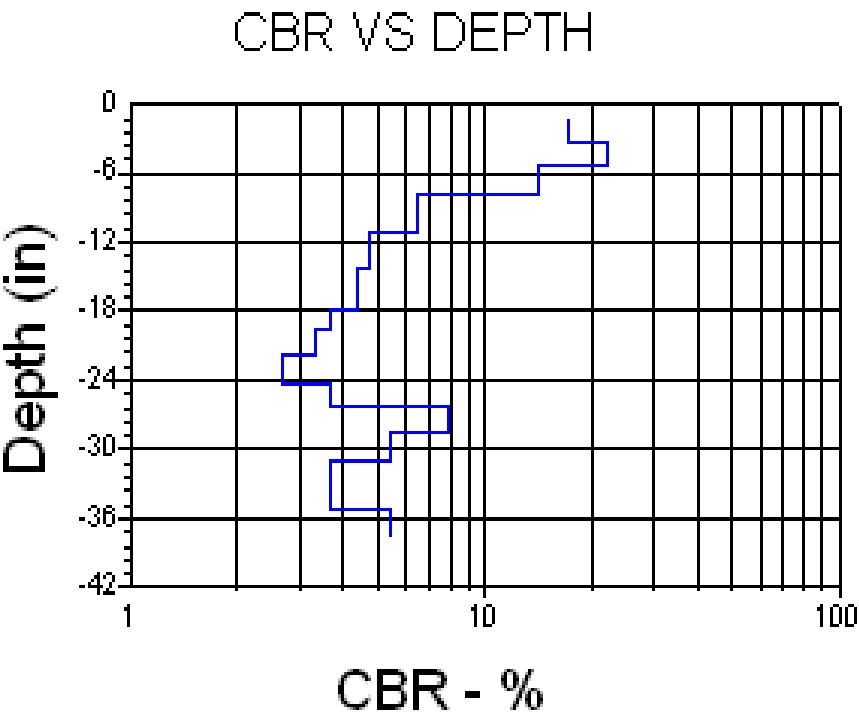


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" K 161	0
254	UNASSIGNED 6.00" K 300	5
381	UNASSIGNED 6.00" K 221	10
508	UNASSIGNED 6.00" K 247	15
635		20
762	UNASSIGNED 14.00" K 153	25
889		30
1016		35
1143		40
1270		45
		50

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-09

Date: 21 May 2010  
Station: 10A2S-TEMF-09

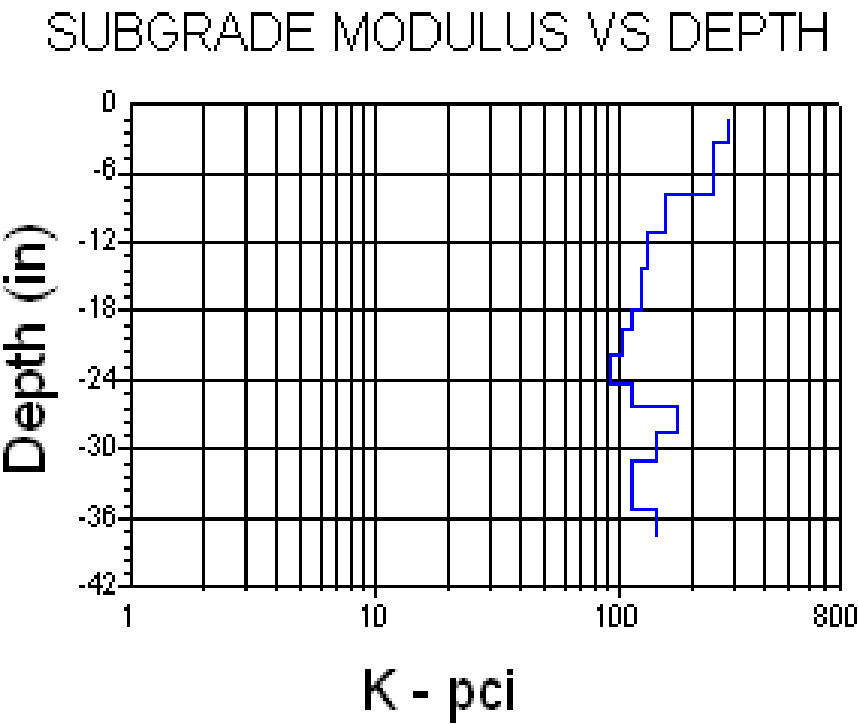


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.25"	
127	SUBGRADE 4.75" CBR 19	0
254	UNASSIGNED 6.00" CBR 8	5
381	UNASSIGNED 6.00" CBR 4	10
508	UNASSIGNED 6.00" CBR 3	15
635		20
762	UNASSIGNED 14.00" CBR 5	25
889		30
1016		35
1143		40
1270		45
		50

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-09

Date: 21 May 2010  
Station: 10A2S-TEMF-09

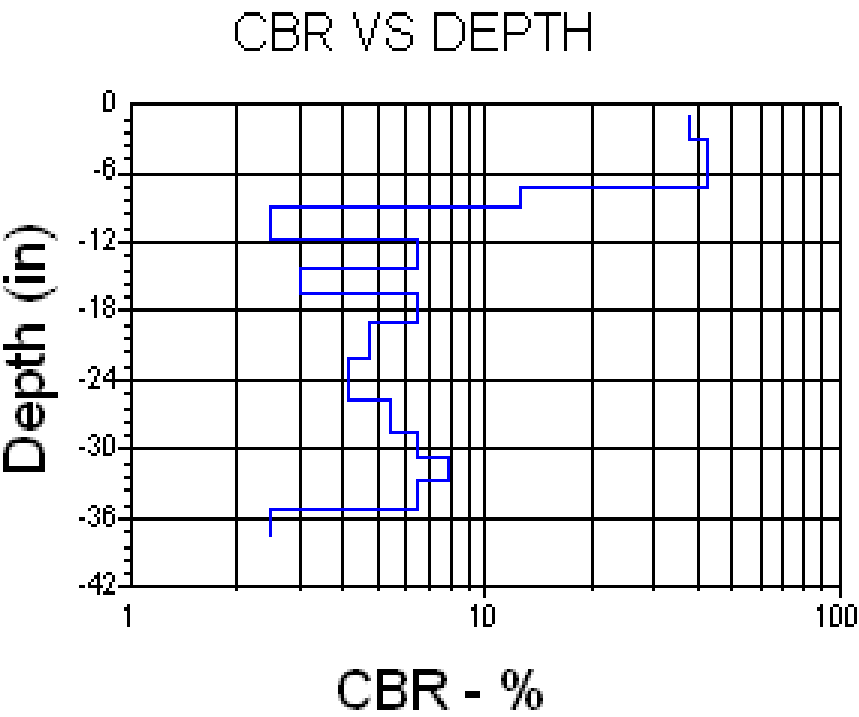


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.25"	
127	SUBGRADE 4.75" K 258	0
254	UNASSIGNED 6.00" K 172	5
381	UNASSIGNED 6.00" K 123	10
508	UNASSIGNED 6.00" K 104	15
635		20
762	UNASSIGNED 14.00" K 129	25
889		30
1016		35
1143		40
1270		45

DCP TEST DATA

Project: Unit Operations Facilities (TEMF)  
Feature: 10A2S-TEMF-10

Date: 21 May 2010  
Station: 10A2S-TEMF-10



(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.00"	
127	SUBGRADE 5.00" CBR 41	0
254	UNASSIGNED 6.00" CBR 13	5
381	UNASSIGNED 6.00" CBR 5	10
508	UNASSIGNED 6.00" CBR 5	15
635	UNASSIGNED 6.00" CBR 5	20
762	UNASSIGNED 14.00" CBR 6	25
889		30
1016		35
1143		40
1270		45
		50

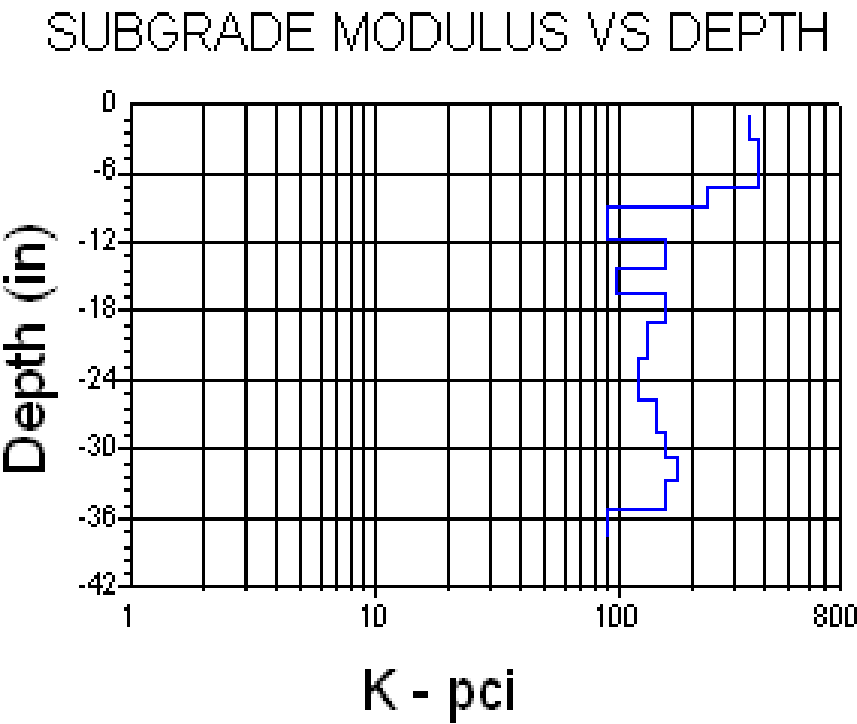
DCP TEST DATA

Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-10

Station: 10A2S-TEMF-10

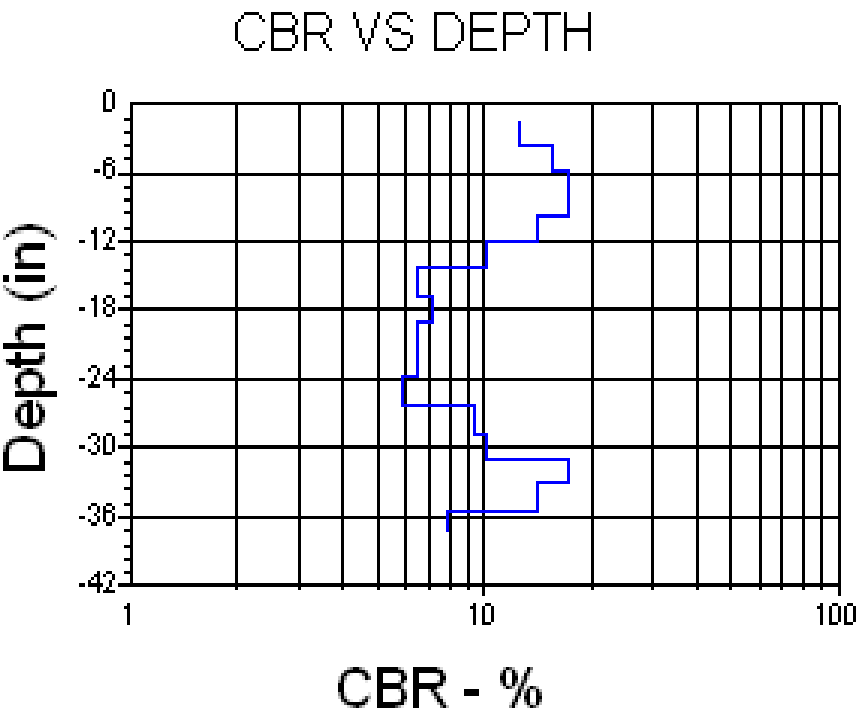


(MM)		TEST PROFILE	(IN)
0		START DEPTH = 1.00"	
127		SUBGRADE 5.00" K 360	0
254		UNASSIGNED 6.00" K 194	5
381		UNASSIGNED 6.00" K 128	10
508		UNASSIGNED 6.00" K 134	15
635			20
762		UNASSIGNED 14.00" K 141	25
889			30
1016			35
1143			40
1270			45
			50

DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-11

Date: 21 May 2010  
Station: 10A2S-COF-11

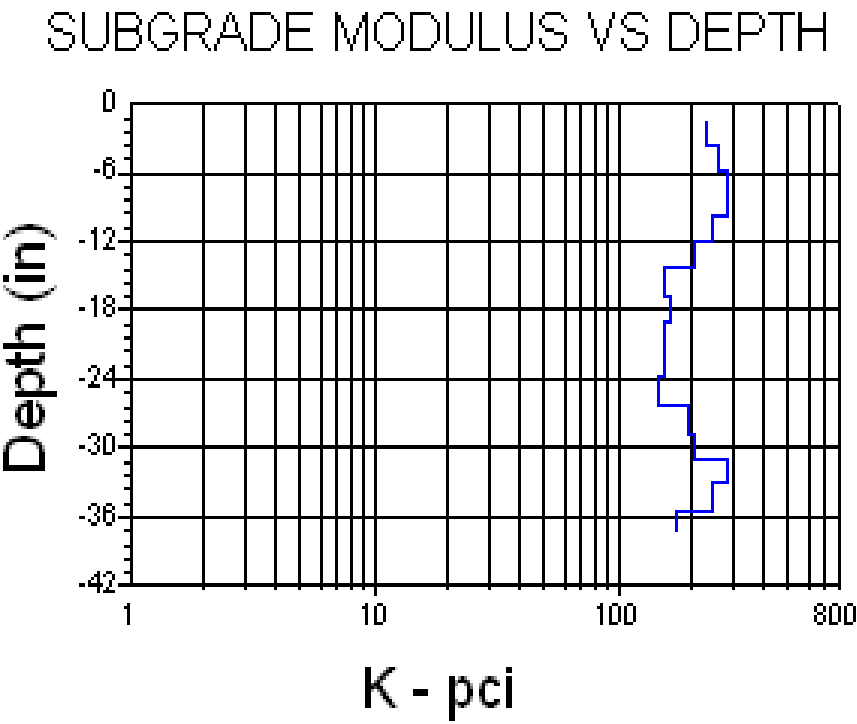


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" CBR 15	0
254	UNASSIGNED 6.00" CBR 16	5
381	UNASSIGNED 6.00" CBR 9	10
508	UNASSIGNED 6.00" CBR 7	15
635		20
762	UNASSIGNED 13.50" CBR 11	25
889		30
1016		35
1143		40
1270		45
		50

DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-11

Date: 21 May 2010  
Station: 10A2S-COF-11



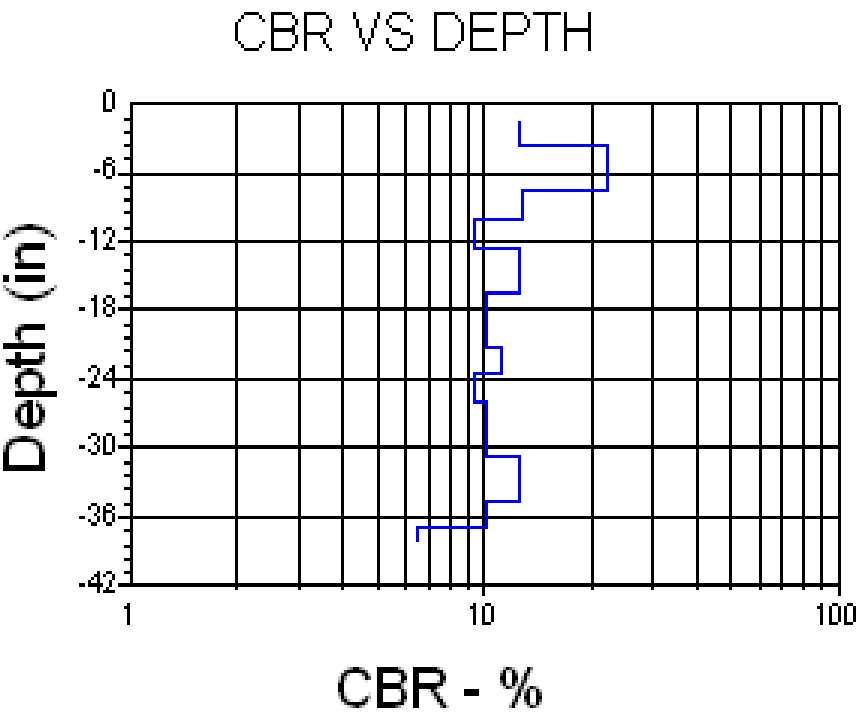
(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" K 251	0
254	UNASSIGNED 6.00" K 269	5
381	UNASSIGNED 6.00" K 188	10
508	UNASSIGNED 6.00" K 156	15
635		20
762	UNASSIGNED 13.50" K 212	25
889		30
1016		35
1143		40
1270		45
		50



DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-12

Date: 21 May 2010  
Station: 10A2S-COF-12

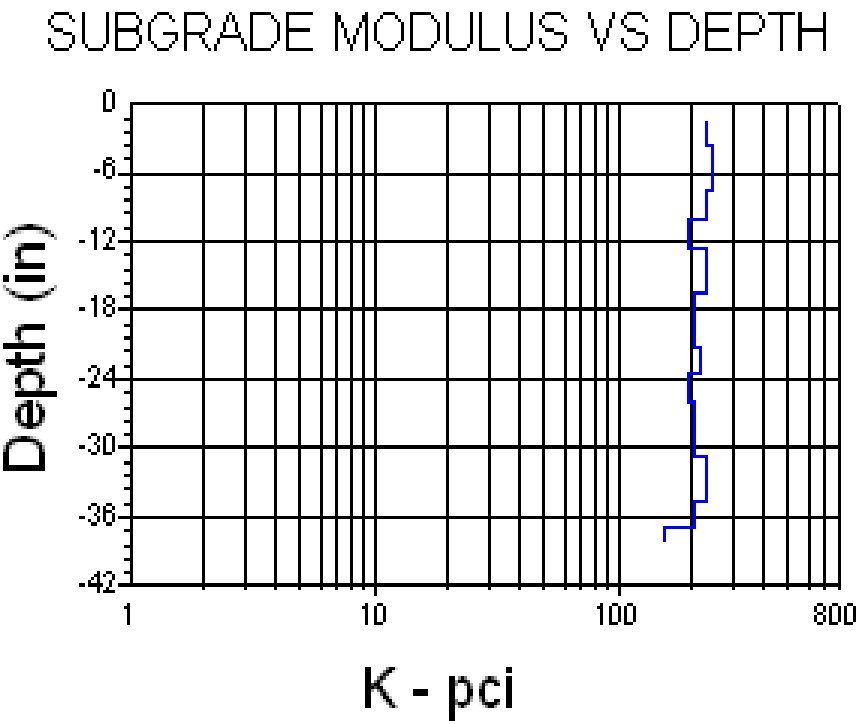


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" CBR 18	0
254	UNASSIGNED 6.00" CBR 14	5
381	UNASSIGNED 6.00" CBR 12	10
508	UNASSIGNED 6.00" CBR 10	15
635		20
762	UNASSIGNED 14.25" CBR 10	25
889		30
1016		35
1143		40
1270		45
		50

DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-12

Date: 21 May 2010  
Station: 10A2S-COF-12

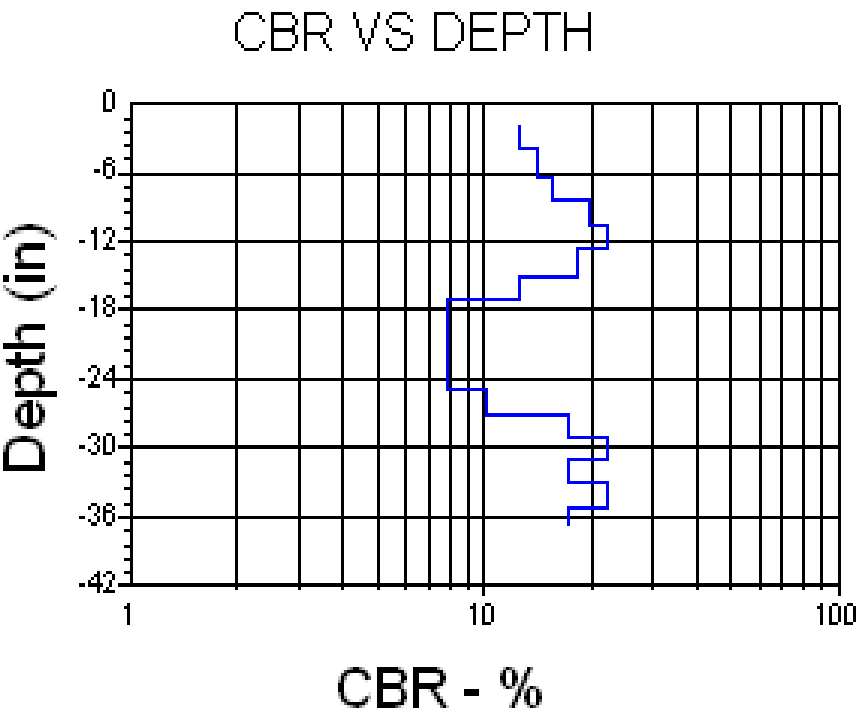


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" K 239	0
254	UNASSIGNED 6.00" K 226	5
381	UNASSIGNED 6.00" K 219	10
508	UNASSIGNED 6.00" K 205	15
635		20
762	UNASSIGNED 14.25" K 203	25
889		30
1016		35
1143		40
1270		45
		50

DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-15

Date: 21 May 2010  
Station: 10A2S-COF-15



(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.75"	
127	SUBGRADE 4.25" CBR 13	0
254	UNASSIGNED 6.00" CBR 18	5
381	UNASSIGNED 6.00" CBR 15	10
508	UNASSIGNED 6.00" CBR 8	15
635		20
762	UNASSIGNED 13.25" CBR 17	25
889		30
1016		35
1143		40
1270		45

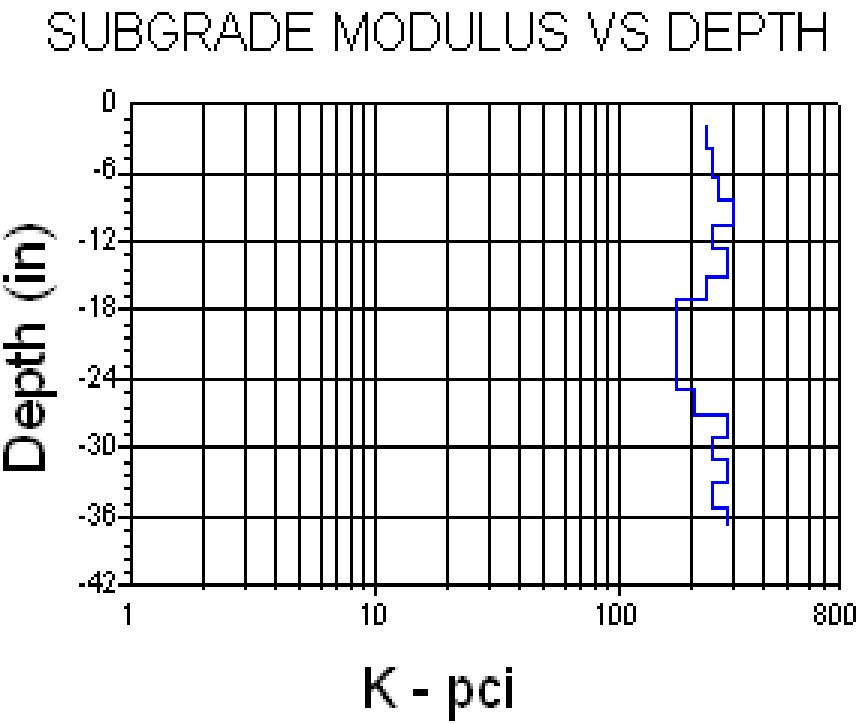
DCP TEST DATA

Project: Unit Operations Facilities (COF)

Date: 21 May 2010

Feature: 10A2S-COF-15

Station: 10A2S-COF-15

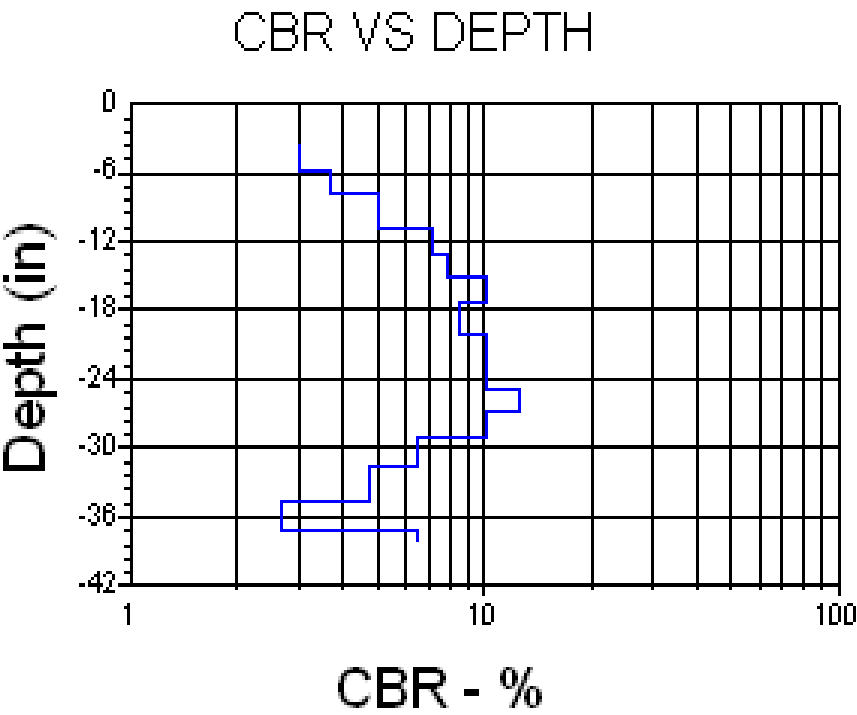


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.75"	
127	SUBGRADE 4.25" K 235	0
254	UNASSIGNED 6.00" K 269	5
381	UNASSIGNED 6.00" K 241	10
508	UNASSIGNED 6.00" K 175	15
635		20
762	UNASSIGNED 13.25" K 248	25
889		30
1016		35
1143		40
1270		45
		50

DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-16

Date: 21 May 2010  
Station: 10A2S-COF-16

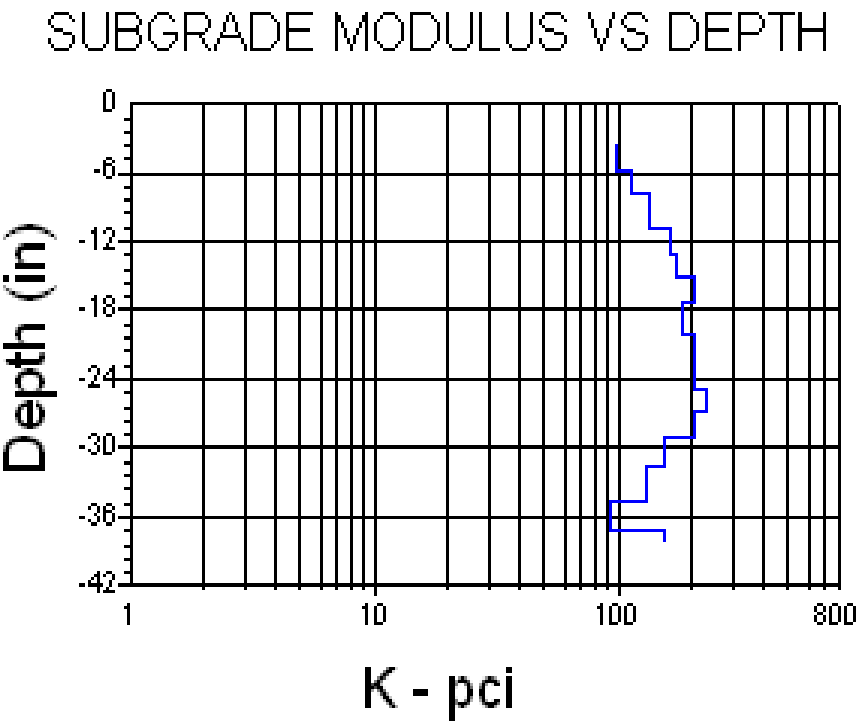


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 3.50"	0
127	SUBGRADE 2.50" CBR 3	5
254	UNASSIGNED 6.00" CBR 5	10
381	UNASSIGNED 6.00" CBR 9	15
508	UNASSIGNED 6.00" CBR 10	20
635		25
762	UNASSIGNED 14.50" CBR 7	30
889		35
1016		40
1143		45
1270		50

DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-16

Date: 21 May 2010  
Station: 10A2S-COF-16

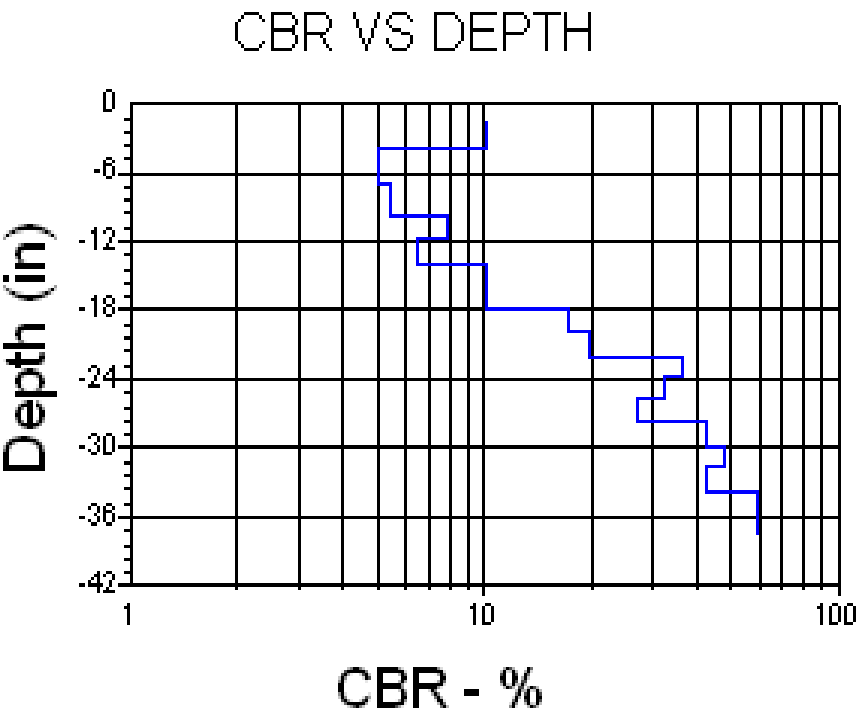


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 3.50"	0
127	SUBGRADE 2.50" K 104	5
254	UNASSIGNED 6.00" K 137	10
381	UNASSIGNED 6.00" K 184	15
508	UNASSIGNED 6.00" K 199	20
635		25
762	UNASSIGNED 14.50" K 165	30
889		35
1016		40
1143		45
1270		50

DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-19

Date: 21 May 2010  
Station: 10A2S-COF-19

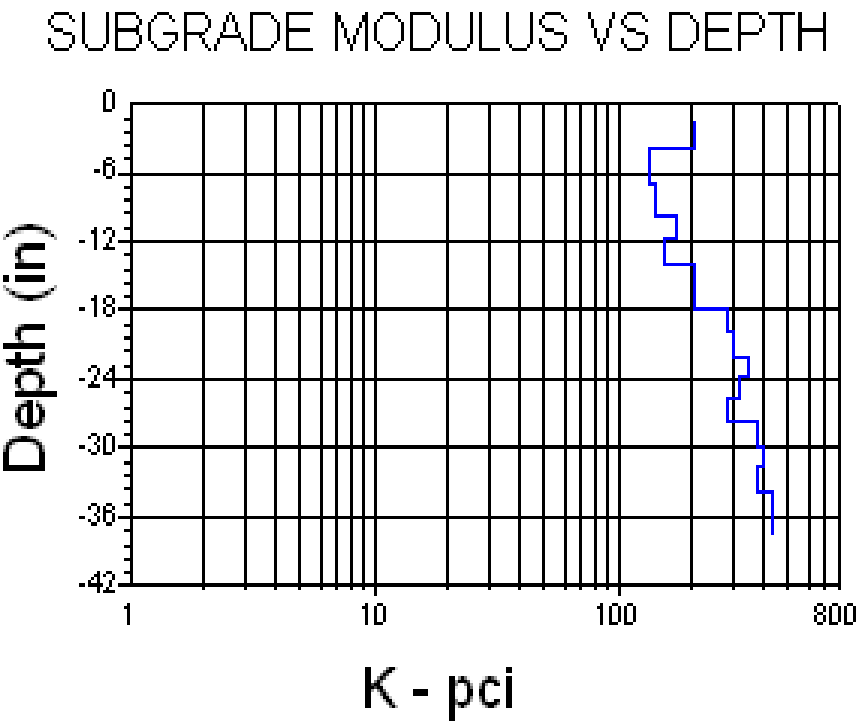


(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" CBR 8	0
254	UNASSIGNED 6.00" CBR 6	5
381	UNASSIGNED 6.00" CBR 11	10
508	UNASSIGNED 6.00" CBR 27	15
635		20
762	UNASSIGNED 13.75" CBR 45	25
889		30
1016		35
1143		40
1270		45

DCP TEST DATA

Project: Unit Operations Facilities (COF)  
Feature: 10A2S-COF-19

Date: 21 May 2010  
Station: 10A2S-COF-19



(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.50"	
127	SUBGRADE 4.50" K 180	0
254	UNASSIGNED 6.00" K 154	5
381	UNASSIGNED 6.00" K 208	10
508	UNASSIGNED 6.00" K 312	15
635		20
762	UNASSIGNED 13.75" K 374	25
889		30
1016		35
1143		40
1270		45
		50



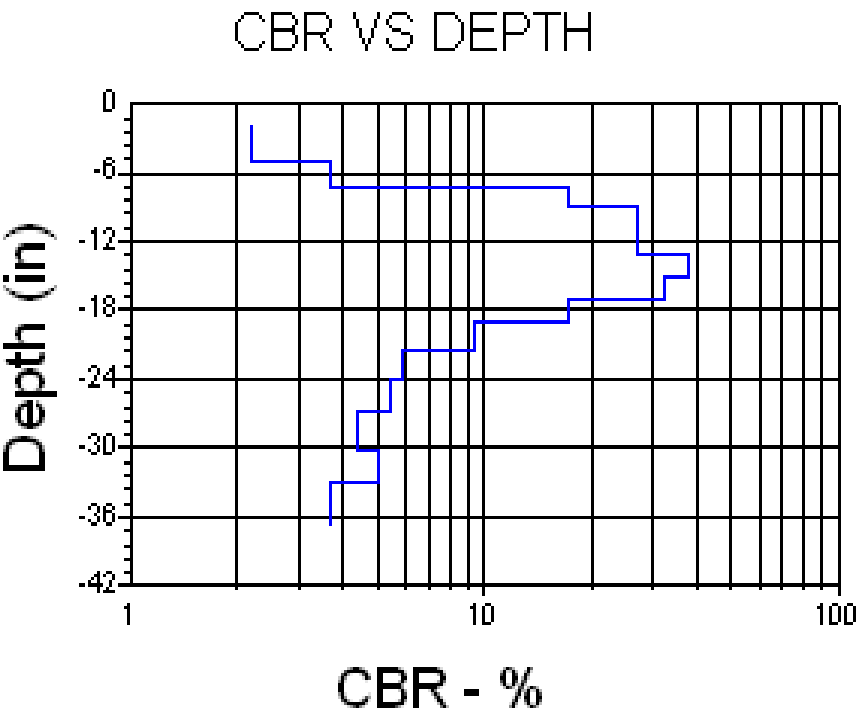
DCP TEST DATA

Project: Unit Operations Facilities (COF)

Date: 21 May 2010

Feature: 10A2S-COF-20

Station: 10A2S-COF-20



(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.75"	
127	SUBGRADE 4.25" CBR 3	0
254	UNASSIGNED 6.00" CBR 20	5
381	UNASSIGNED 6.00" CBR 31	10
508	UNASSIGNED 6.00" CBR 10	15
635	UNASSIGNED 6.00" CBR 10	20
762	UNASSIGNED 13.25" CBR 5	25
889		30
1016		35
1143		40
1270		45

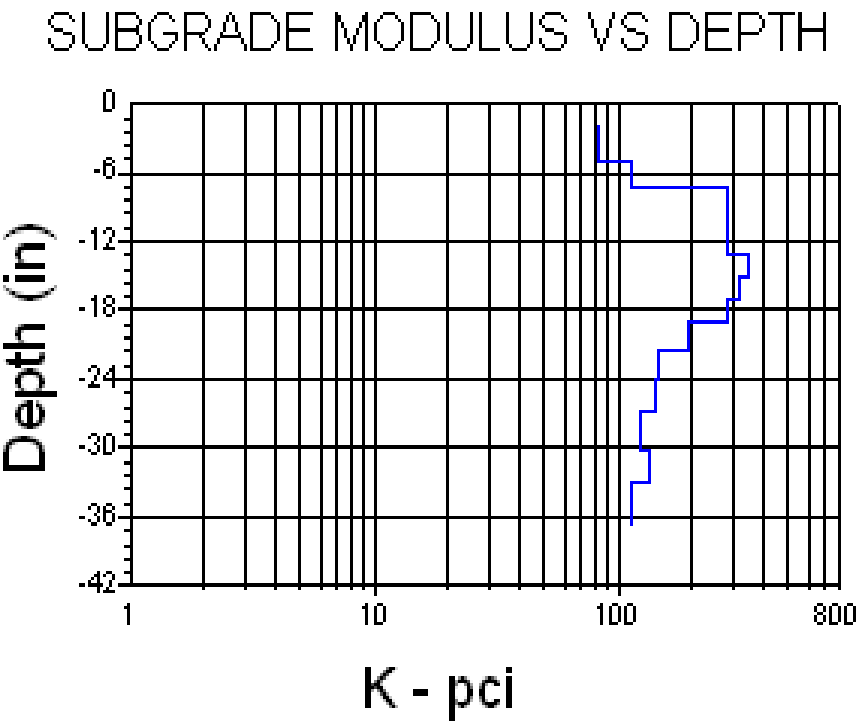
DCP TEST DATA

Project: Unit Operations Facilities (COF)

Date: 21 May 2010

Feature: 10A2S-COF-20

Station: 10A2S-COF-20



(MM)	TEST PROFILE	(IN)
0	START DEPTH = 1.75"	
127	SUBGRADE 4.25" K 93	0
254	UNASSIGNED 6.00" K 253	5
381	UNASSIGNED 6.00" K 314	10
508	UNASSIGNED 6.00" K 203	15
635	UNASSIGNED 6.00" K 203	20
762	UNASSIGNED 13.25" K 130	25
889		30
1016		35
1143		40
1270		45
		50

## **APPENDIX E**

### **MAT FOUNDATION DESIGN CRITERIA**

WALLACE

REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
SOUTHWESTERN DIVISION, CORPS OF ENGINEERS  
1114 COMMERCE STREET  
DALLAS, TEXAS 75242-0216

CESWD-ED-TS/G (415a)

29 JAN 1989

## MEMORANDUM FOR:

Commander, Albuquerque District, ATTN: CESWA-ED  
✓ Commander, Fort Worth District, ATTN: CESWF-ED-DT  
Commander, Galveston District, ATTN: CESWG-ED  
Commander, Little Rock District, ATTN: CESWL-ED  
Commander, Tulsa District, ATTN: CESWT-ED

SUBJECT: Design Criteria for Ribbed Mat Foundations

1. This letter supersedes criteria letter, SWDED-TS/G, 23 Dec 1986, SAB.
2. The enclosed criteria shall be used for design of all ribbed mat foundations. This criteria has been revised to conform with the definition of swell pressure (soil-beam interface pressure) as presented in criteria letter, SWDED-G, 16 Apr 1987, subject: Criteria for Developing Geotechnical Design Parameters for SWD Ribbed Mat Design Methodology. Also, clarification has been provided for application of the PTI design method to family housing.
3. This criteria is furnished to addressees only.

FOR THE COMMANDER:

Encl

*William D. Denys*  
ARTHUR D. DENYS, P.E.  
Chief, Engineering Division

IV

7-01

10 YEARS OF SERVICE

TO THE SOUTHWEST

Friday, April 29, 2011

**DESIGN OF RIBBED MAT FOUNDATIONS**

**BY**

**JOSEPH P. HARTMAN**

**AND**

**B. H. JAMES**

**U.S. ARMY CORPS OF ENGINEERS**

**SOUTHWESTERN DIVISION**

**DALLAS, TEXAS**

**REVISED**

**JANUARY 1988**

## CONTENTS

### PART I - GENERAL REQUIREMENTS FOR RIBBED MATS

1. References
2. Background
3. Design Methods
  - 3.1 Expansive Soils
    - 3.1.1 Behavior
    - 3.1.2 SWD Method
    - 3.1.3 PTI Method
    - 3.1.4 BRAB Method
    - 3.1.5 Computer Method
    - 3.1.6 Load Factors
  - 3.2 Non-Expansive Soils
  - 3.3 Soil Properties
4. Minimum Requirements
  - 4.1 Subgrade Preparation
  - 4.2 Slab
  - 4.3 Grid Geometry
  - 4.4 Rib Size
  - 4.5 Rib Capacity
  - 4.6 Prestressed Mats
  - 4.7 Construction Details

### PART II - ANALYSIS OF RIBBED MAT FOUNDATIONS ON EXPANSIVE SOILS

1. Scope
2. General Information
  - 2.1 Notation
  - 2.2 Units
  - 2.3 Rib Definitions
  - 2.4 Strip Analysis
  - 2.5 Soil Edge Profile
3. Analysis Method
  - 3.1 Transverse Rib - Center Lift
  - 3.2 Transverse Rib - Edge Lift
  - 3.3 Perimeter Rib
  - 3.4 Diagonal Rib
  - 3.5 Interior Rib

### APPENDIX A - COMMENTARY ON PART II

### APPENDIX B - DESIGN EXAMPLE

## PART I - GENERAL REQUIREMENTS FOR RIBBED MATS

### 1. REFERENCES.

1.1 Engineering Instruction Manual, Corps of Engineers, Southwestern Division, (latest edition).

1.2 "Criteria for Selection and Design of Residential Slabs-on-Ground," Building Research Advisory Board (BRAB), Report No. 33 to the Federal Housing Administration, 1968.

1.3 "Design and Construction of Post-Tensioned Slabs-on-Ground," Post Tensioning Institute (PTI), 1980.

1.4 TM 5-818-7, Foundations in Expansive Soils, Corps of Engineers, 1983.

1.5 Letter, SWDED-G, 16 April 1987, Criteria for Developing Geotechnical Design Parameters for Ribbed Mat Design Methodology (Criteria Letter XV 7-12).

2. BACKGROUND. Ribbed mat foundations consist of a thin slab on grade which acts monolithically with a grid of stiffening beams beneath the slab. The beams (ribs) are cast in trenches dug in the foundation soil. Ribbed mats combine the economic advantages of shallow foundations with the performance advantages of monolithic floors. Ribbed mats are especially useful for minimizing differential foundation movements in areas with expansive soils.

### 3. DESIGN METHODS.

#### 3.1 EXPANSIVE SOILS.

##### 3.1.1 Behavior.

3.1.1.1 Center Lift. In the center lift condition the soil near the edge of the slab drops in relation to the soil near the center. This is due to moisture retention by the interior soils and the drying and shrinking of perimeter soils. As this occurs, the perimeter soil provides less support for the edge of the slab which then acts as a cantilever. This is illustrated in Figure A1 of Appendix A.

3.1.1.2 Edge Lift. In the edge lift condition the soil near the edge of the slab rises in relation to the soil near the center. This is due to the increasing moisture content and subsequent swelling of soil near the edge. The swelling soil raises the edge of the slab, causing some of the slab to lift off the soil. Interior loads cause the slab to sag and recontact the soil at some interior location. The slab thus tends to act as

a beam, simply supported by the soil at the edge, and by soil towards the center of the slab. The amount of support at the center depends on numerous parameters such as interior loads, rib bending stiffness, soil swell pressures, and the magnitude of soil swelling. Typical edge lift behavior is illustrated in Figure A3 of Appendix A.

3.1.2 SWD Method. All ribbed mats on expansive soils, except for family housing, shall be designed in accordance with the provisions of Part II of this report. Ribbed mats for family housing may be designed in accordance with Part II or paragraphs 3.1.3 or 3.1.4.

3.1.3 PTI Method. The PTI method (reference 1.3) may only be used for design of family housing foundations on expansive soils. Specifically, slab width (short dimension) should not exceed 40 feet, rib depths should not exceed 30 inches, loading should consist only of perimeter loads and light interior distributed loads ( $DL+LL \leq 100$  psf), soils should be fairly weak in-situ materials with no extensive substitution of non-expansive fill. When using the PTI method, the following provisions shall apply: Rib spacing shall not exceed 15 feet; concrete tensile stress shall not exceed  $4\sqrt{f'_c}$ ; the minimum effective prestress shall be 100 psi.

3.1.4 BRAB Method. The BRAB report (reference 1.2) may only be used for design of foundations for family housing. However, the PTI method is preferred, since the BRAB method may produce unreasonable results for large foundations.

3.1.5 Computer Method. In lieu of paragraph 3.1.2, ribbed mats may be designed using appropriate computer programs. Such programs must be capable of modeling the variable soil swell due to moisture changes, and the non-linear soil-structure interaction near the perimeter of the foundation. One such computer program is CBEAMC, program X0050 in the Corps of Engineers Civil Engineering Library.

3.1.6 Load Factors. When using the above methods to design ribbed mats for center lift and edge lift conditions, load factors may be multiplied by .75 (strength method) or allowable stresses may be increased by one-third (working stress method). This provision does not apply to the allowables given for the PTI method, since those allowables have already been increased from the usual provisions of ACI.

3.2 NON-EXPANSIVE SOILS. Ribbed mat slabs on non-expansive soils need not be designed for bending due to center lift or edge lift conditions. Beam on elastic foundation analyses may be used to determine the effects of concentrated loads on ribs, or ribs may be designed as conventional strip or spot footings.



3.3 SOIL PROPERTIES. Soil properties for design of ribbed mats will be provided in the Foundation Design Analysis by the Corps of Engineers. Criteria for developing these properties is included in reference 1.5. The properties necessary for design in accordance with paragraph 3.1.2 consist of the following, which are defined in Appendix A:

- qa - allowable bearing pressure
- k - subgrade modulus
- Ym - soil heave
- Lm - edge moisture variation distance
- Psw - pressure of swelling soil acting on perimeter rib

#### 4. MINIMUM REQUIREMENTS.

4.1 SUBGRADE PREPARATION. A vapor barrier, capillary water barrier, and a minimum of 18 inches of non-expansive fill will normally be used beneath ribbed mats. Additional non-expansive fill will often be used to lessen the effects of highly expansive soils. These requirements will be detailed in the Foundation Design Analysis.

4.2 SLAB. For family housing and other small lightly loaded buildings a 4 inch slab may be used. For other buildings the minimum slab thickness will be 5 inches. Minimum slab reinforcing shall be 0.2 percent. Where slabs are subjected to vehicular loading they must be designed for the maximum wheel load, similar to paving. Use 650 psi flexural strength concrete for slabs subject to wheel loads.

4.3 GRID GEOMETRY. Ribs should be located to form a continuous grid. Rib spacing should not exceed 20 feet in expansive soils, or 25 feet in non-expansive soils. Locations of ribs should conform to significant wall and column loads, and may be used to resist thrusts from rigid frame reactions. Ribs should be provided around large openings in the slab. In expansive soils diagonal ribs are required at exterior corners.

Expansion joints should be provided at 250 foot intervals, and should also be used to break irregularly shaped buildings into rectangular segments. Foundations for family housing do not require expansion joints due to irregular shapes.

4.4 RIB SIZE. Minimum rib depth is 20 inches. Rib depths should usually not exceed 3 feet to minimize construction difficulties related to placing reinforcement and maintaining trench walls. If deeper ribs are used, rib width should also be increased. Minimum rib width is 12 inches except for family housing foundations, where 10 inch ribs may be used. Sufficient rib width must also be provided to transfer wall and column loads to the soil as strip footings. The allowable soil bearing capacity may not be exceeded when considering the width of the rib plus an effective slab width on each side of the rib. The

effective slab width for bearing is limited to the thickness of the slab. At column locations an alternate is to provide fillets at rib intersections, sufficient to act as spot footings for column loads.

4.5 RIB CAPACITY. Concrete should have a minimum compressive strength of  $f'_c=3000$  psi at 28 days. Reinforcing shall be grade 60, except ties may be grade 40. Minimum reinforcing ratio ( $A_s/A_g$ ) shall be .0033 top and .0033 bottom, this may be reduced to .005 total in non-expansive soils. Use #3 ties at 24 inches, minimum. These minimums should be sufficient for shrinkage stresses and for unpredictable soil behavior.

4.6 PRESTRESSED MATS. For prestressed ribbed mats, not designed per PTI, all the above minimum requirements apply except that slab and rib top reinforcement may be deleted and replaced by appropriate post-tensioning strands. Mild steel shall still be provided in the bottom of ribs. Minimum effective prestress shall be 100 psi on the gross area of the slab, including effects of subgrade friction as calculated by the PTI method, reference 1.3. Concrete tensile stress shall be limited to  $3/\sqrt{f'_c}$  and shear stress limited to  $1.1/\sqrt{f'_c}$ . A one-third overstress may be allowed per paragraph 3.1.6.

#### 4.7 CONSTRUCTION DETAILS.

4.7.1 Conventionally Reinforced. Construction joint spacing should not exceed 50 feet in either direction. A horizontal construction joint may be provided in the ribs at the base of the capillary water barrier when unstable trench walls may cause construction difficulties. However, this joint is discouraged because of increased potential for shrinkage cracks in the slab.

4.7.2 Prestressed. Construction joint spacing shall not exceed 75 feet in either direction. Tendons within each placement shall be stressed to 15 percent of the final prestress not more than 24 hours after the concrete has attained sufficient strength to withstand the partial prestress. Other construction procedures for prestressed ribbed mats shall conform to reference 1.3.

4.7.3 Contractor Designs. Ribbed mat foundations may be designed as prestressed or conventionally reinforced as selected by the engineer. The plans and specifications shall not include the option of changing the ribbed mat from one type to another. The reason for this prohibition is that design parameters (e.g., moments of inertia) may be dependent on the type of ribbed mat being designed and may affect calculated shears and moments. This does not prohibit revisions of the slab type as a result of contractor value engineering proposals. However, such revisions must include a complete design of the ribbed mat foundation using appropriate design parameters in accordance with this report.

## PART II - ANALYSIS OF RIBBED MAT FOUNDATIONS ON EXPANSIVE SOILS

1. SCOPE. This part of the report contains the basic rules for design of ribbed mats in expansive soils. This method may be used to predict shears, moments and deflections in ribs subject to soil movement due to changing moisture content. For a commentary on the design method refer to Appendix A; for example design calculations refer to Appendix B. The design method from Part II should be used in conjunction with the "minimum requirements" for ribbed mats, as presented in Part I.

### 2. GENERAL

#### 2.1 NOTATION.

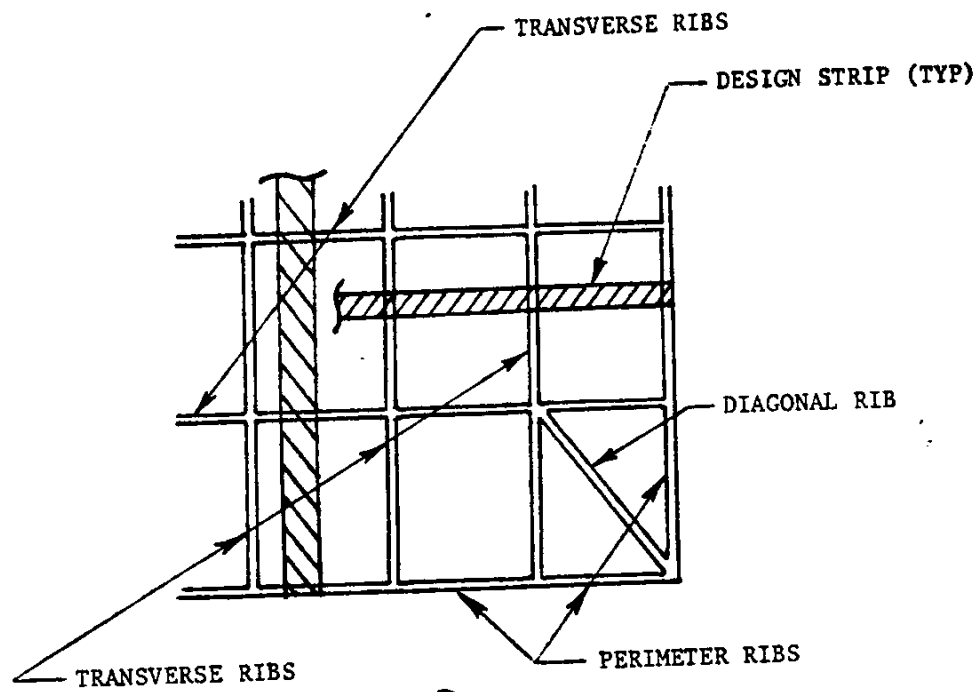
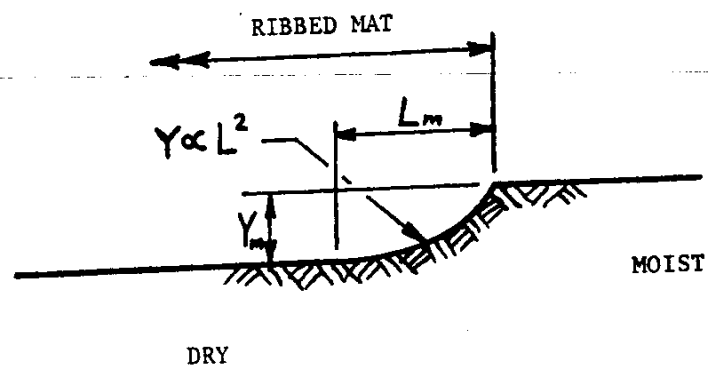
C	= Correction factor for equivalent cantilever length
D	= Beam deflection (IN)
I	= Moment of inertia per foot, $I = I_r/S$ (IN <sup>4</sup> /FT)
$I_r$	= Moment of inertia of rib (IN <sup>4</sup> )
* k	= Modulus of subgrade reaction (PCI)
$L_o$	= Basic length of cantilever (FT)
$L_c$	= Equivalent length of cantilever, center lift (FT)
$L_e$	= Equivalent length of simple beam, edge lift (FT)
$L_i$	= Distance from perimeter to location of interior load (FT)
* $L_m$	= Edge moisture variation distance (FT)
$L_b$	= Width of soil bearing at perimeter, edge lift (FT)
M	= Bending moment per foot (FT-LB/FT)
$M_r$	= Bending moment per rib, $M_r = M \times S$ (FT-LB)
$P_i$	= Interior load (PLF)
$P_p$	= Perimeter load (PLF)
* $P_{sw}$	= Pressure of swelling soil on perimeter rib (PSF)
R	= End reaction at perimeter for equivalent simple beam (PLF)
S	= Rib spacing (FT)
w	= Uniform load (PSF)
V	= Shear per foot (LB/FT)
$V_r$	= Shear per rib, $V_r = V \times S$ (LB)
* $Y_m$	= Soil heave (IN)
$\theta$	= Rotation of support of equivalent cantilever (RAD)

\*  $q_a$  = ALLOWABLE  
BEARING  
PRESSURE  
(PSF)

2.2 UNITS. The equations presented in section 3 are written for units as defined in the above notation. If other units are used the equations must be modified appropriately.

2.3 RIB DEFINITIONS. Ribs are defined as perimeter, transverse or diagonal as shown in Figure 1. Note that transverse refers to ribs parallel to either axis of the building.

\* VALUES NEEDED FROM GEOTECH

FIGURE 1 - RIB DEFINITIONSFIGURE 2 - SOIL EDGE PROFILE

2.4 STRIP ANALYSIS. The analysis is based on a strip assumption, ignoring the effects of the grid configuration of the ribs. The formulas and examples presented below are for an equivalent 1-foot strip, using "per foot" values for loads and stiffness.

2.5 SOIL EDGE PROFILE. For edge lift the maximum swell occurs at the perimeter and decreases rapidly toward the interior. The soil profile is assumed to be parabolic (in the unloaded condition) and is illustrated in Figure 2.

### 3. ANALYSIS METHOD.

#### 3.1 TRANSVERSE RIB - CENTER LIFT.

3.1.1 General. Center lift analysis is based on an equivalent cantilever beam to determine moments, shears and deflections.

3.1.2 Moment. The length of the equivalent cantilever can be calculated as:

$$L_c = C \times L_o$$

where:  $L_o = 2.3 + .4 L_m$

$$C = .8 Y_m^{.12} I^{.16} / P_p^{.12}$$

The maximum moment may then be calculated from statics using conventional cantilever formulas such as:

$$M = P_p L_c + 1/2 w L_c^2$$

The moment can then be assumed to be constant for a distance  $L_c/2$  and then to decrease linearly to zero at a distance  $5L_c$  from the perimeter. To obtain the design moment for a given rib, multiply the calculated per-foot moment by the appropriate rib spacing ( $M_r = M \times S$ ).

3.1.3 Shear. The maximum shear may be calculated from statics using the same equivalent cantilever as for moment.

$$V = P_p + w L_c$$

The shear may then be assumed to decrease linearly from  $V$  at the cantilever support, to zero at a distance  $5L_c$  from the perimeter. To obtain the design shear for a given rib, multiply the calculated per-foot shears by the appropriate rib spacing ( $V_r = V \times S$ ).

3.1.4 Deflection. Deflection at the perimeter is the sum of three components: bending deflection of the equivalent cantilever, vertical translation of the cantilever support, and rotation

of the cantilever support. Rotation of the support may be calculated as:

$$\theta = M^{1.4} / 9800 I k^{.5}$$

The perimeter deflection is then:

$$D = .11 + 12 L_c \theta$$

where .11 inches is an approximation for the support translation plus the cantilever bending, and (12 L<sub>c</sub>) is the length in inches.

Use the deflection calculated above to compare with allowable deflection. The allowable deflection may be determined by using 4L<sub>c</sub> as the length between points of zero and maximum deflection.

### 3.2 TRANSVERSE RIB - EDGE LIFT.

3.2.1 General. Edge lift analysis is based on an equivalent simple beam, supported at the perimeter and at some interior location.

3.2.2 Deflection. The first step in calculating deflection is to determine the length of the equivalent simple beam. The appropriate length depends on many parameters, including the deflection. Therefore, deflection must first be estimated to determine equivalent length, then a deflection is calculated based on that length. The process is repeated until calculated deflection matches the assumed deflection. The equivalent simple beam length may be calculated as:

$$L_e = 7.5 I^{.17} L_i^{.37} D^{.12} / w^{.07} P_i^{.11}$$

The perimeter end reaction for this beam may be calculated from statics. For a given case the reaction may be:

$$R = P_p + 1/2 w L_e + P_i(L_e - L_i)/L_e$$

The width of soil bearing at the perimeter can be approximated as:

$$L_b = 1.1 (R/P_{sw})$$

where P<sub>sw</sub> is selected from a curve of heave versus bearing pressure, corresponding to the estimated deflection used during this iteration (see reference 1.5).

The edge deflection is found by determining the soil swell at a distance L<sub>b</sub> from the perimeter, based on the parabolic swell profile:

$$D = Y_m(L_m - L_b)^2 / L_m^2$$

When satisfying deflection criteria, use the calculated deflection and equivalent simple beam length.

3.2.3 Moment. Once the simple beam equivalent length has been determined, the bending moments may be calculated based on statics. To obtain rib design moments, multiply per-foot moments by the rib spacing.

3.2.4 Shear. Once the simple beam equivalent length has been determined, the shears may be calculated based on statics. To obtain rib design shears, multiply per-foot shears by the rib spacing. Near the interior support the design shear need not exceed:

$$V = P_i + w(L_e - L_i)$$

This is due to the effects of the actual distributed soil support, rather than the point support assumed in the simple beam analysis.

3.2.5 Special Cases. If  $P_i=0$  or if  $L_i > L_e$  make the following substitution in the equation for  $L_e$ :

$$1.4 = L_i^{.37} / P_i^{.11}$$

The equation for the simple beam length then becomes:

$$L_e = 10.5 I^{.17} D^{.12} / w^{.07}$$

### 3.3 PERIMETER RIB.

3.3.1 Center Lift. For center lift the perimeter rib will have no support from the soil and must be designed to span between transverse ribs for the perimeter wall loads.

3.3.2 Edge Lift. For edge lift the soil pressure on the perimeter rib will exceed the applied perimeter loads. The perimeter rib must be designed to span between transverse ribs for this net upward force.

3.4 DIAGONAL RIB. Diagonal ribs are used to support exterior corners for center lift conditions, if loss of support occurs under both perimeter ribs. Diagonal ribs must be designed to provide the same moment and shear capacity as the larger of the two adjacent transverse ribs.

3.5 INTERIOR RIB. Interior ribs and rib intersections should be located at significant wall and column loads. The ribs can be designed for these loads as strip or spot footings, using beam-on-elastic-foundation methods. Differential soil movement due to moisture change is assumed not to occur except at the perimeter. However, to account for unpredictable interior soil movements, interior ribs must have the minimum size and capacity as required in Part I.

## APPENDIX A - COMMENTARY ON PART II

1. SCOPE. Actual behavior of ribbed mats in expansive soils involves complex, non-linear, soil-structure interaction. The best solution for such behavior is provided by computer programs. The hand design method has been developed to approximate such computer results. Hand solutions have been checked by computer analyses; results have been within acceptable limits of error. However, such checks have been made only for a limited range for each design parameter, as shown in Table A1, corresponding to the usual values for military construction within Southwestern Division. If a wider range of parameters is applied to the hand design formulas, the results may be less accurate.

TABLE A1

Parameter	Units	Minimum	Maximum
k	pci	50	200
Ym	in	0.5	3.0
Lm	ft	2	8
I	in <sup>4</sup> /ft	750	6000
Pp	lb/ft	1000	5000
Pi	lb/ft	0	5000
Li	ft	6	20
w	psf	100	250
Psw	psf	2000	8000

## 2. GENERAL.

## 2.1 NOTATION.

$I_r$  = moment of inertia of rib. For non-prestressed rib mats  $I_r$  should be the effective moment of inertia, calculated per ACI 318, Section 9.5.2.3.

$k$  = Modulus of subgrade reaction. This parameter is the ratio of the soil pressure at the base of the concrete and the corresponding settlement. Since modulus values are typically determined by plate-load test at the ground surface, they should be corrected for depth and for footing size (expected high pressure area between concrete and soil). Analyses have indicated that the high bearing pressure area for center lift conditions will occur in an area several feet long parallel to the transverse rib and several feet on each side of the rib. A crude approximation for this area would be 5 feet square. This approximation should be adequate for design, since calculations are not sensitive to small changes in the modulus of subgrade reaction.



$q_a$  = Allowable bearing pressure. This is the safe bearing capacity of the soil at the base of the ribs. A factor of safety of 3.0 is recommended for computing this value.

$L_m$  = Edge moisture variation distance. This represents the distance, inward from the edge of the slab, over which the moisture content of the soil changes. Much judgement is required in determining this value.

$P_{sw}$  = Pressure of swelling soil on perimeter rib. This is the interface pressure between the soil and the base of the exterior rib, due to an increase in soil moisture content. The pressure which can be exerted by the swelling soil is dependent on the amount the surface of the soil is allowed to rise. Therefore  $P_{sw}$  is usually presented as a curve of pressure versus heave, as described in reference 1.5 of Part I. The actual upward deflection of the edge of the slab is a complex interaction between swell potential, structural loads, and mat stiffness, all of which combine to determine the interface pressure near the perimeter.

$Y_m$  = Soil heave. This is the differential vertical movement of the soil representing either soil heave (edge lift) or soil shrinkage (center lift). The magnitude of  $Y_m$  is the computed vertical movement of a particle of soil at the ground surface due to a change in moisture content. This value should be based on the accumulation of potential volume changes for the full thickness of the active zone ( $Z_a$ ), with no significant loads applied to the foundation. The value of  $Y_m$  may differ for edge lift and center lift conditions.

$P_i$ ,  $P_p$ ,  $w$  = Applied loads. Loads should consist of full dead plus live loads, including dead load of the slab and ribs.

## 2.2 UNITS.

## 2.3 RIB DEFINITIONS.

2.4 STRIP ANALYSIS. The hand solution formulas have been developed for analysis of an equivalent 1 foot strip. This is convenient for uniform loads and for soil properties, but requires some calculations for appropriate concentrated loads and bending stiffness. Rib stiffness must be divided by rib spacing to get the per-foot stiffness. If column loads exist they must also be divided by the rib or column spacing to provide an equivalent load per foot. If interior wall loads are parallel to the transverse rib, they must be divided by the rib spacing. These calculations are illustrated in Appendix B.

2.5 SOIL EDGE PROFILE. The edge lift condition occurs when increased moisture content swells exterior soils, and this effect extends under the edge of the slab. The center lift condition occurs when soils under the slab are generally moist and seasonal drying occurs on the exterior, again extending under the slab. This causes the soil to shrink away from the edge of the slab.

The analysis method is based on an assumed parabolic swell profile which occurs uniformly along the perimeter. This is a convenient idealization of actual soil behavior, which is certainly more erratic. However, the parabolic profile has better correlation with measured swells than do other possible edge profile assumptions. Note that the soil profile is not used in the hand design formulas for center lift. However, a parabolic profile was used in the computer analyses for center lift, which formed the basis for the hand design formulas.

3. ANALYSIS METHOD. Many of the formulas for shears, moments and reactions are idealized, assuming  $P_p$  and  $R$  are exactly at the perimeter and that  $w$  extends to the perimeter. These approximations should usually be acceptable, but the formulas may be modified to account for actual load patterns.

### 3.1 TRANSVERSE RIB - CENTER LIFT

3.1.1 General. Typical behavior of a transverse rib for center lift conditions is shown in Figure A1. This illustrates the soil bearing pressure and the shear, moment and deflection. Note that the effects of the soil movement extend much farther than the moisture variation distance. The moment and shear distribution close to the edge resemble cantilever behavior.

3.1.2 Moment. The extent of significant moments is illustrated in Figure A1. The length of the equivalent cantilever can be taken as a basic length ( $L_0$ ) which is dependent on the moisture variation distance, times a correction factor ( $C$ ) which accounts for secondary effects of several parameters. The value of the correction factor will usually be slightly greater or less than unity. The correction factor was developed to permit accurate approximations of computer results. It was developed from the ratios of actual values to usual values for significant parameters. For example, the "usual" values are:  $Y_m = 1$  in,  $I = 1500$  in<sup>4</sup>/ft,  $P_p = 3000$  lb/ft. Thus:

$$C = (Y_m/1.0)^{.12} (I/1500)^{.16} (3000/P_p)^{.12}$$

$$C = .8 Y_m^{.12} I^{.16} / P_p^{.12}$$

A similar approach was used to develop all the formulas in Part II which have an exponential format.

3.1.3 Shear. Maximum shear occurs near the support of the equivalent cantilever. The extent of significant shears is illustrated in Figure A1.

3.1.4 Deflection. Formulas for deflection include an assumed concrete modulus of elasticity  $E_c = 3,320,000$  psi, for both center lift and edge lift.

Vertical movement at the perimeter is much greater than the bending deflection of the equivalent cantilever. To predict the deflection it is necessary to consider translation and rotation at the support of the equivalent beam. The most significant component is due to rotation at the support. These

components of deflection are shown in Figure A2. The sum of the cantilever bending and the support translation are approximated by the value 0.11 inch. The percent error due to this approximation is negligible when total deflections are large. The percent error is greater when total deflections are small, but then the deflections are not significant anyway.

Allowable deflections (see Part I, reference 1.1) are expressed as a ratio of the difference in vertical movement at any two points, compared to the distance between those points. For example:  $D \leq L/600$ , where  $D$  is the differential displacement. In such formulas it is appropriate to use the point of maximum deflection and a point of near-zero deflection as the two measuring points. For center lift behavior the maximum deflection occurs at the perimeter, and deflections tend to die out at approximately  $4L_c$  (four times the equivalent cantilever length) from the perimeter. Therefore, the ratio  $D/4L_c$  is appropriate for comparison with allowable deflections.

### 3.2 TRANSVERSE RIB - EDGE LIFT.

3.2.1 General. Typical behavior of a transverse rib for edge lift conditions is shown in Figure A3. This illustrates the soil bearing pressure and the shear, moment and deflection. Soil swell lifts the edge of the ribbed mat, which actually rises off the soil for some distance from the perimeter. For shear and moment, this portion of the rib acts as a simply supported beam spanning between soil support at the perimeter and at an interior location.

3.2.2 Deflection. Vertical movement at the perimeter is driven by the tendency of the soil to swell, and is resisted by the downward loads applied on the soil. As the soil swells at the perimeter the slab is lifted off the interior soil. This concentrates soil reactions near the edge, causing very high pressures. The pressures rise so high that they limit the capacity of the soil to swell. Thus, the soil cannot swell as much as it would if not loaded. Deflections can be predicted by balancing the upward force of the soil (the swell pressure times the bearing width) with the downward force of applied loads. This downward force can be determined from statics once an equivalent simple beam length is determined. The method for determining the deflection is shown in Figure A4.

Allowable deflections are expressed as ratios, as discussed in the commentary on paragraph 3.1.4. From Figure A3 it can be seen that the appropriate values for this ratio are the edge deflection and the equivalent simple beam length ( $D/L_c$ ).

Edge lift deflections are mainly a function of soil properties and applied loads, bending stiffness of the ribs has only a secondary effect. Therefore, it may not be possible to control deflections by increasing the rib stiffness. It may be necessary to accommodate calculated deflections by using a less brittle superstructure or by detailing the superstructure to make it less sensitive to deflections. Or it may be necessary to modify soil properties to minimize the edge heave.

3.2.3 Moment. The moments can be calculated by statics, using the equivalent simple beam. The maximum moment will occur at the point of zero shear. Note that the maximum moment is quite sensitive to the beam length, therefore the iterative solution for deflection and appropriate swell pressure must converge accurately before calculating moments.

3.2.4 Shear. Shears can also be calculated by statics from the equivalent simple beam. Note that shears will reduce gradually to near-zero around the interior end of the beam because of the distributed soil support.

3.2.5 Special Cases. If no concentrated interior load exists, or if it is very far from the perimeter, the formula for the simple beam length must be adjusted as shown. This adjusted formula was also developed to duplicate results from computer solutions.

### 3.3 PERIMETER RIB.

### 3.4 DIAGONAL RIB.

3.5 INTERIOR RIB. Potential soil heaves in the interior are unpredictable and are generally due to localized moisture conditions, for example, due to a leaking pipe. Such conditions cannot be accounted for by design formulas. Adequate strength and stiffness for such unpredictable heaves should be supplied by the minimum requirements listed in Part I of the report. For interior wall or column loads the interior ribs should be designed in accordance with Part I, section 3.2.

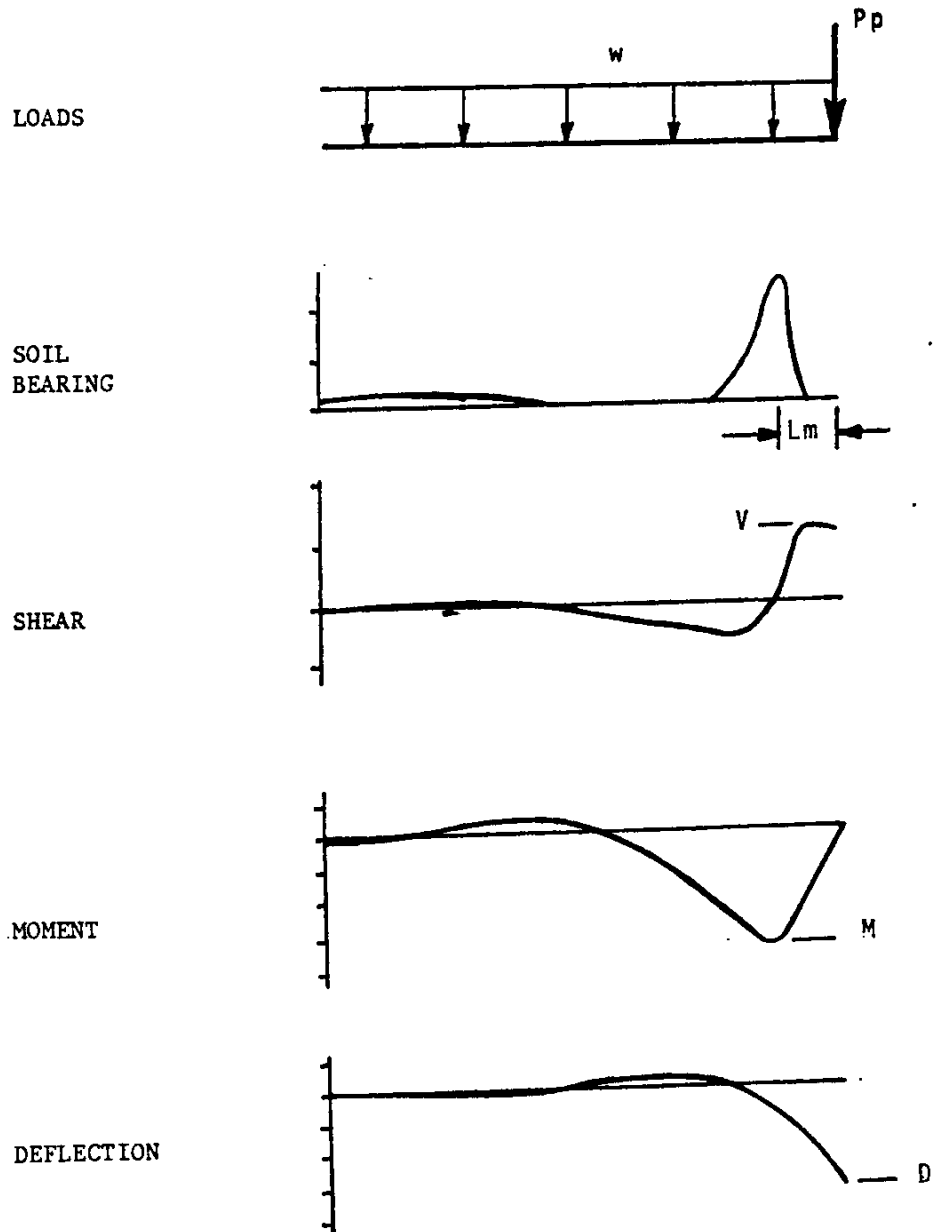
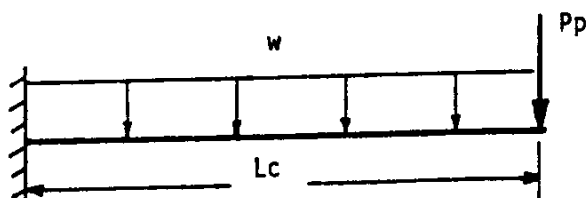
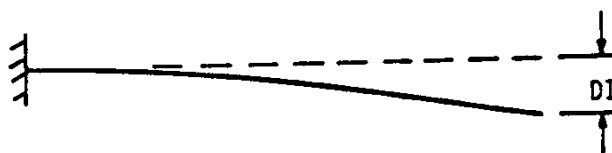
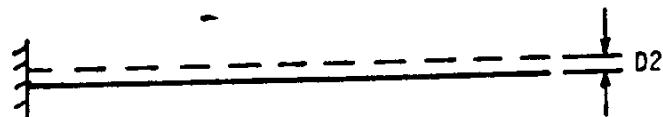
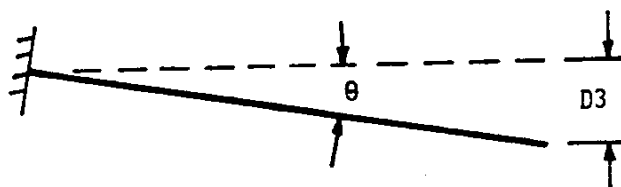
FIGURE A1 - CENTER LIFT BEHAVIOR

FIGURE A2 - CENTER LIFT DEFLECTIONEQUIVALENT  
CANTILEVERCANTILEVER  
BENDINGSUPPORT  
TRANSLATIONSUPPORT  
ROTATION

$$D = D1 + D2 + D3$$

$$D1 + D2 = .11$$

$$D3 = 12 Lc \theta$$

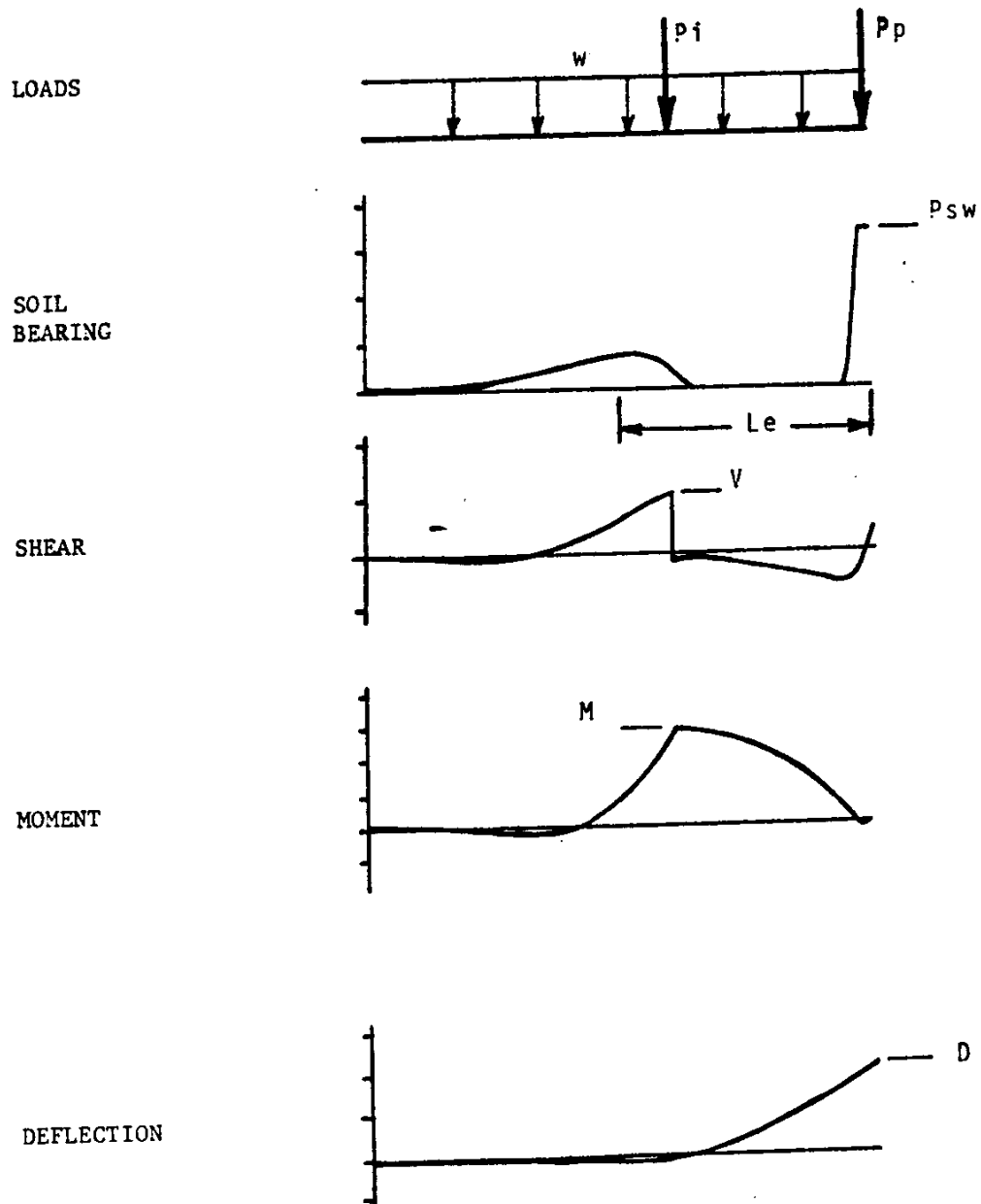
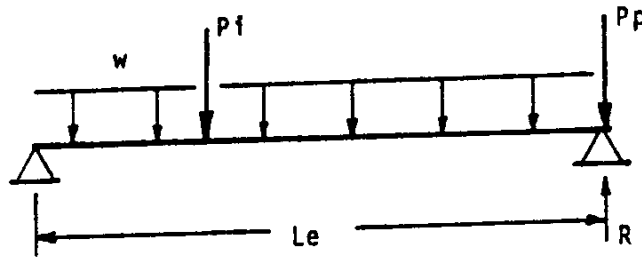
FIGURE A3 - EDGE LIFT BEHAVIOR

FIGURE A4 - EDGE LIFT DEFLECTION

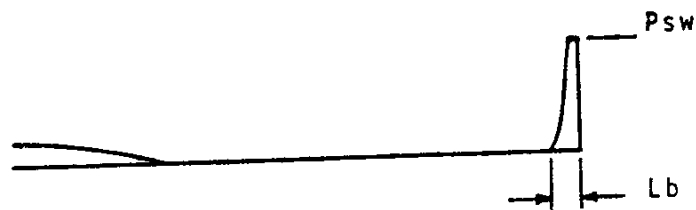
EQUIVALENT  
SIMPLE BEAM



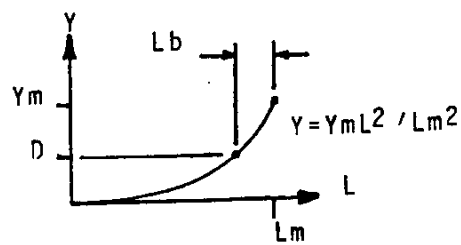
DEFLECTED  
SHAPE



BEARING  
PRESSURE



SOIL  
EDGE  
PROFILE



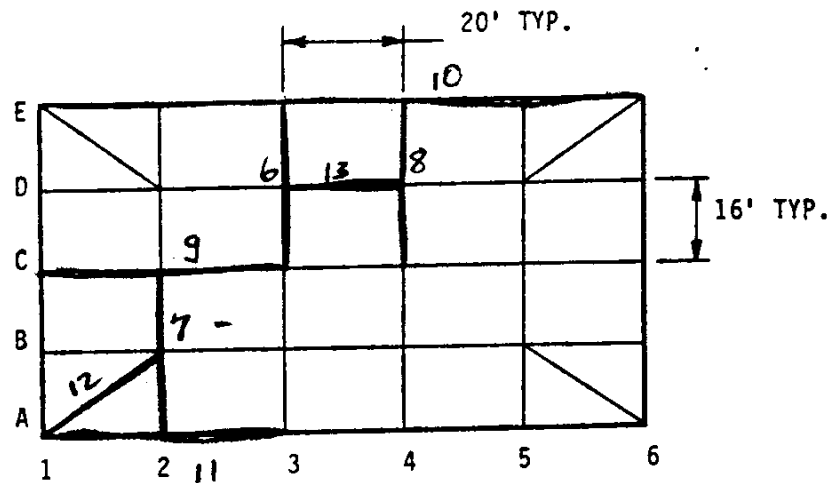


APPENDIX B - DESIGN EXAMPLE  
(RIBBED MAT DESIGN IN EXPANSIVE SOIL)

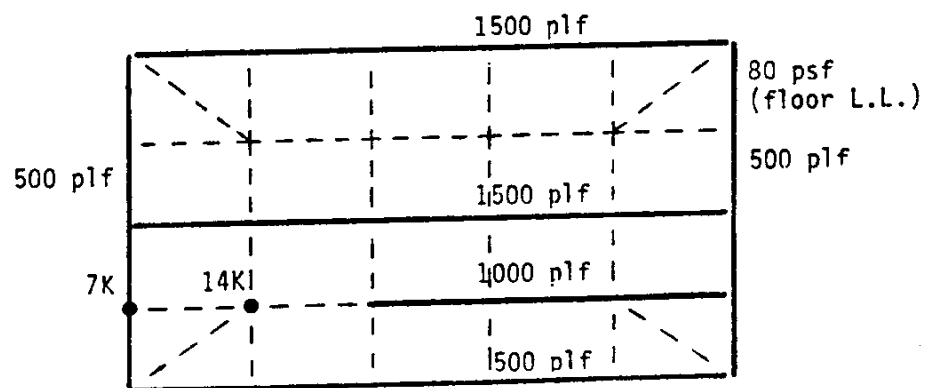
1. SOIL DATA (ref. Part I - 3.3)

$q_a = 2000 \text{ psf}$   
 $P_{sw} = (\text{see page B9})$   
 $k = 100 \text{ pci}$   
 $L_m = 6 \text{ ft}$   
 $Y_m = 1.5 \text{ in for center lift}$   
 $Y_m = 1.0 \text{ in for edge lift}$

2. FOUNDATION PLAN (ref. Part I - 4.3)



3. LOADS



B1

## 4. BEARING DESIGN FOR RIBS (ref. Part I - 4.4)

Maximum wall load (P) = 1500 plf

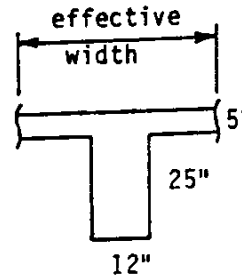
Width  $\geq P/q_a = 1500/2000 = .75$  ft

Use 12 inch wide ribs (minimum)

## 5. INTERIOR RIB PROPERTIES (ref. Appendix A - 2.1)

$E_c = 3,320,000$  psi

(effective flange width  
per ACI 318, section 8.10.2  
For "span length" use  $4L_c$   
for center lift or  $L_e$  for  
edge lift)



Let  $I_r = 36,000$  in<sup>4</sup> for center lift  
 $I_r = 24,000$  in<sup>4</sup> for edge lift  
 (ref. ACI 318, section 9.5.2.3, verify  $I_r$  after  
 calculating M)

$I = I_r/S$  (in<sup>4</sup>/ft):

Rib spacing	16 ft	20 ft
Center lift	2250	1800
Edge lift	1500	1200

## 6. CENTER LIFT DESIGN - RIB E3/C3

## 6.1 Loads (ref. Appendix A - 2.1)

slab weight = 150 pcf x 5/12 ft = 62 psf

$w = DL + LL = 62 + 80 = 142$  psf

rib weight = 150 pcf x 2.5 ft x 1.0 ft = 375 plf

$P_p = \text{rib} + \text{wall} = 375 + 1500 = 1875$  plf

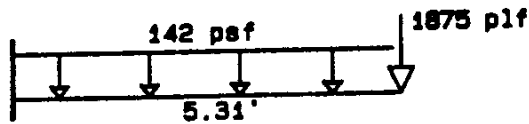
## 6.2 Equivalent cantilever (ref. Part II - 3.1)

$$L_o = 2.3 + .4 L_m = 2.3 + (.4 \times 6) = 4.7 \text{ ft}$$

$$C = .8 Y_m \cdot I^{.16} / P_p \cdot I^{.12}$$

$$C = .8 \times 1.5 \cdot 1800 \cdot I^{.16} / 1875 \cdot I^{.12} = 1.13$$

$$L_c = L_o C = 4.7 \times 1.13 = 5.31 \text{ ft}$$



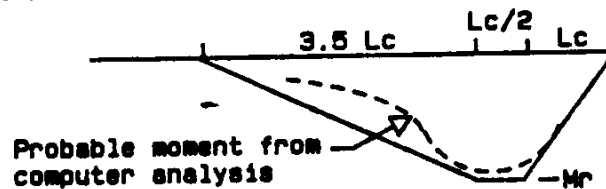
## 6.3 Moment (ref. Part II - 3.1.2)

$$M = P_p L_c + 1/2 w L_c^2$$

$$M = 1875 \times 5.31 + 1/2 \times 142 \times 5.31^2 = 12,000 \text{ ft-lb/ft}$$

$$M_r = M \times S = 12000 \times 20 = 240,000 \text{ ft-lb/rib}$$

Design moments:

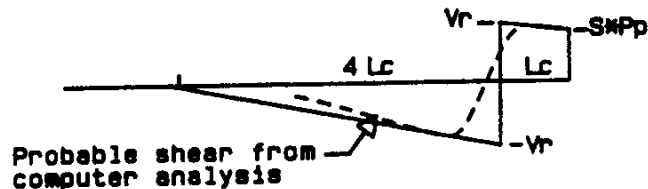


## 6.4 Shear (ref. Part II - 3.1.3)

$$V = P_p + w L_c = 1875 + 142 \times 5.31 = 2630 \text{ lb/ft}$$

$$V_r = V \times S = 2630 \times 20 = 52,600 \text{ lb/rib}$$

Design shears:



## 6.5 Reinforcing in rib (ref. Part I - 3.1.6 and 4.5)

$$A_s = (M_r / a_d) / 1.33$$

$$A_s = 240 / (1.76 \times 28 \times 1.33) = 3.66 \text{ in}^2 \text{ (top)}$$

use 3 #10 bars

$$v = V_r / b_d = 52600 / (12 \times 28) = 157 \text{ psi}$$

$$v_c = (1.1 \sqrt{f'_c}) / 1.33 = 80 \text{ psi}$$

$$A_v = (v - v_c) b_s / (f_s \times 1.33)$$

$$A_v = (157 - 80) \times 12 \times 12 / (24000 \times 1.33) = .35 \text{ in}^2 / \text{ft}$$

use #4 stirrups @ 12 in

## 6.6 Deflection (ref. Part II - 3.1.4)

$$\theta = M^{1.4} / 9800 I k^{.5}$$

$$\theta = 12000^{1.4} / (9800 \times 1800 \times 100^{.5}) = .0029 \text{ radians}$$

$$D = .11 + 12 L_c \theta = .11 + 12 \times 5.31 \times .0029 = .29 \text{ in}$$

$$D / 4 L_c = .29 / (4 \times 5.31 \times 12) = 1 / 879 \quad \text{O.K.}$$

1062

## 7. EDGE LIFT DESIGN - RIB A2/C2

## 7.1 Loads

$$w = 142 \text{ psf (same as above)}$$

$$P_p = \text{rib} + \text{wall} = 375 + 500 = 875 \text{ plf}$$

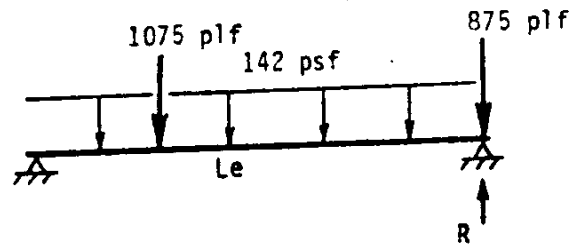
$$P_i = \text{rib} + \text{wall}^* = 375 + 700 = 1075 \text{ plf}$$

\* equivalent wall load = column load / rib spacing

$$14000 / 20 = 700 \text{ plf (ref. Appendix A - 2.4)}$$

$$L_i = 16 \text{ ft}$$

## 7.2 Equivalent simple beam (ref. Appendix A - 3.2.1)



## 7.3 Deflection (ref. Part II - 3.2.2)

$$Le = 7.5 I^{.17} Li^{.37} D^{.12} / w^{.07} Pi^{.11}$$

$$Le = 7.5 \times 1200^{.17} \times 16^{.37} \times D^{.12} / 142^{.07} \times 1075^{.11}$$

$$Le = 22.9 D^{.12}$$

assume  $D = .50$  in (somewhat less than  $Ym = 1.0$  in)

$$Le = 22.9 \times .50^{.12} = 21.1 \text{ ft}$$

$$R = Pp + 1/2 w Le + Pi(Le-Li)/Le$$

$$R = 875 + (142 \times 21.1)/2 + 1075(21.1-16.0)/21.1 = 2633 \text{ plf}$$

from heave/pressure curve (p B9), for  $D=.50$  find  $Psw=2000$

$$Lb = 1.1(R/Psw) = 1.1(2633/2000) = 1.45 \text{ ft}$$

$$D = Ym(Lm-Lb)^2 / Lm^2$$

$$D = 1.0(6.0-1.45)^2 / 6.0^2 = .575 \text{ in} \neq .50 \text{ inch assumed!}$$

assume  $D = .54$  in

$$Le = 22.9 \times .54^{.12} = 21.3 \text{ ft}$$

$$R = Pp + 1/2 w Le + Pi(Le-Li)/Le$$

$$R = 875 + (142 \times 21.3)/2 + 1075(21.3-16.0)/21.3 = 2655 \text{ plf}$$

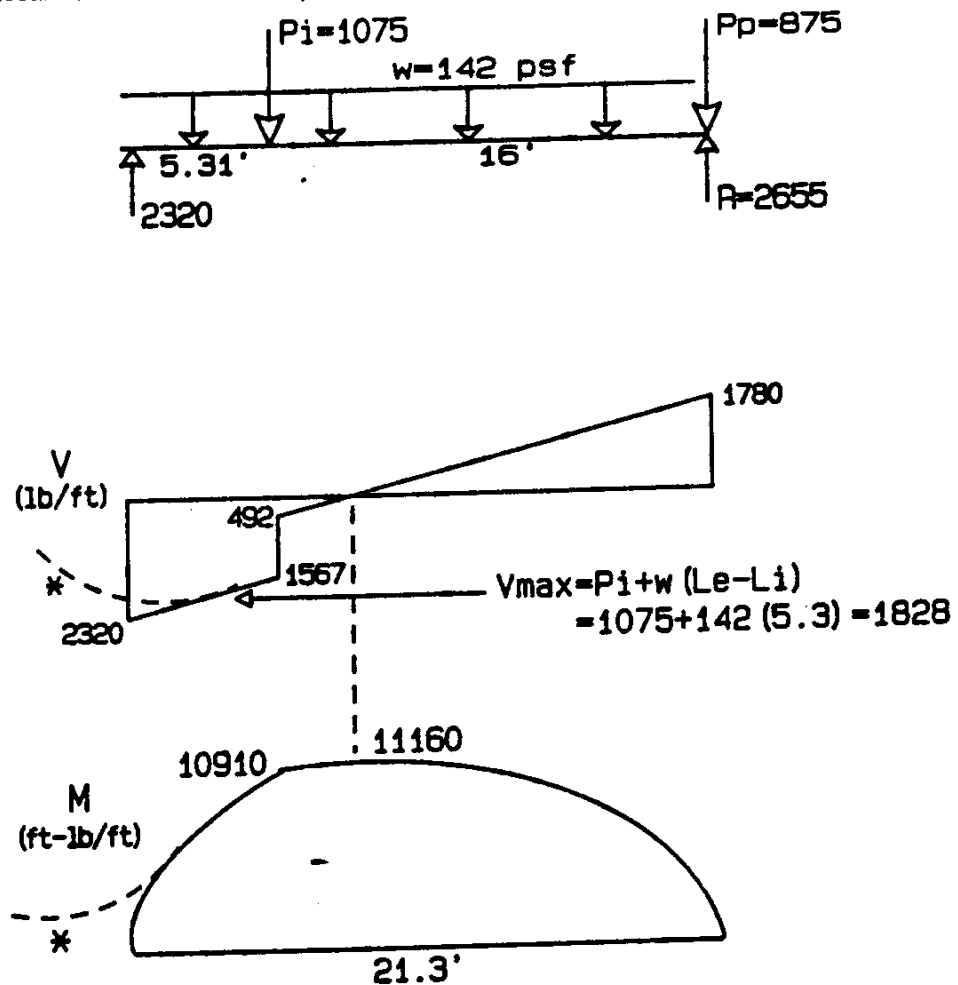
from heave/pressure curve, for  $D=.54$  find  $Psw=1800$  psf

$$Lb = 1.1(R/Psw) = 1.1(2655/1800) = 1.62 \text{ ft}$$

$$D = 1.0(6.0-1.62)^2 / 6.0^2 = .533 \text{ in CONVERGED!}$$

$$D/Le = .54 / (21.3 \times 12) = 1/473 \text{ O.K. for non-brittle walls}$$

## 7.4 Moment and shear (ref. Part II - 3.2.3 and 3.2.4)



\* probable shear and moment from computer analysis, note that calculated  $V = 2320 \text{ lb}$  will not occur, due to the effects of distributed support from the soil

## 8. EDGE LIFT DESIGN - RIB E4/C4

## 8.1 Loads

$w = 142 \text{ psf}$  (same as above)

$P_p = 1875 \text{ plf}$  (same as rib E3/C3)

$L_i = 32 \text{ ft}$  (wall along rib C1/C6)

## 8.2 Deflection

since  $L_i > L_e$  use:

$$L_e = 10.5 I^{.17} D^{.12} / w^{.07} \text{ (ref. Part II - 3.2.5)}$$

$$L_e = 10.5 \times 1200^{.17} \times D^{.12} / 142^{.07} = 24.77 D^{.12}$$

assume  $D = .48$  in

$$\text{then } L_e = 24.77 \times .48^{.12} = 22.7 \text{ ft}$$

$$R = P_p + 1/2 w L_e = 1875 + (142 \times 22.7)/2 = 3485 \text{ plf}$$

from heave/pressure curve, for  $D=.48$  find  $P_{sw}=2100$  psf

$$L_b = 1.1(R/P_{sw}) = 1.1(3485/2100) = 1.825 \text{ ft}$$

$$D = Y_m(L_m - L_b)^2 / L_m^2$$

$$D = 1.0(6.0 - 1.825)^2 / 6.0^2 = .484 \text{ inch CONVERGED!}$$

8.3 Find shears and moments by statics, similar to rib A2/C2.

## 9. CENTER LIFT DESIGN - RIB C1/C3

## 9.1 Loads

$$w = \text{slab} + LL + \text{wall}^* = 62 + 80 + 94 = 236 \text{ psf}$$

$$* \text{ wall} = \text{wall load} / \text{rib spacing} = 1500/16 = 94 \text{ psf} \\ \text{(ref. Appendix A - 2.4)}$$

$$P_p = \text{rib} + \text{wall} = 375 + 500 = 875 \text{ plf}$$

## 9.2 Equivalent cantilever

$$L_o = 2.3 + .4 L_m = 2.3 + (.4 \times 6) = 4.7 \text{ ft}$$

$$C = .8 Y_m^{.12} I^{.16} / P_p^{.12}$$

$$C = .8 \times 1.5^{.12} \times 2250^{.16} / 875^{.12} = 1.28$$

$$L_c = L_o C = 4.7 \times 1.28 = 6.02 \text{ ft}$$

## 9.3 Moment

$$M = P_p L_c + 1/2 w L_c^2$$

$$M = 875 \times 6.02 + (236 \times 6.02^2)/2 = 9544 \text{ ft-lb/ft}$$

$$M_r = M \times S = 9544 \times 16 = 153,000 \text{ ft-lb/rib}$$

## 9.4 Shear

$$V = P_p + w L_c = 875 + (236 \times 6.02) = 2296 \text{ plf}$$

$$V_r = V \times S = 2296 \times 16 = 36,700 \text{ lb/rib}$$

## 9.5 Deflection

$$\theta = M^{1.4} / 9800 I k^{.5}$$

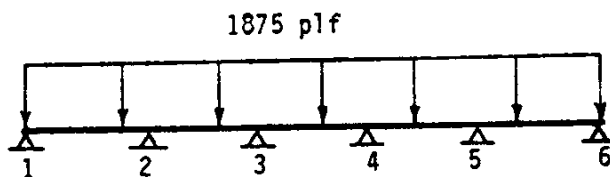
$$\theta = 9544^{1.4} / 9800 \times 2250 \times 100^{.5} = .0017 \text{ radian}$$

$$D = .11 + 12 L_c \theta = .11 + (12 \times 6.02 \times .0017) = .23 \text{ in}$$

## 10. CENTER LIFT DESIGN - PERIMETER RIB E1/E6 (ref. Part II-3.3.1)

## 10.1 Span between transverse ribs

$$P_p = 1875 \text{ plf (from calculations for rib E3/C3)}$$

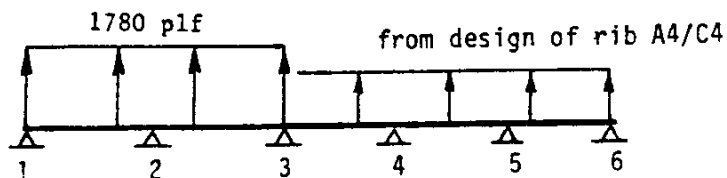


## 10.2 Analyze by conventional methods

## 11. EDGE LIFT DESIGN - PERIMETER RIB A1/A3 (ref. Part II - 3.3.2)

11.1 Span between transverse ribs for net upward force  
(from calculations on rib A2/C2)

$$R - P_p = 2655 - 875 = 1780 \text{ plf (upward)}$$



## 11.2 Analyze by conventional methods



## 12. CENTER LIFT DESIGN - DIAGONAL RIB A1/B2 (ref. Part II - 3.4)

12.1 Provide the larger shear and moment capacity of rib B1/B2 or rib A2/B2.

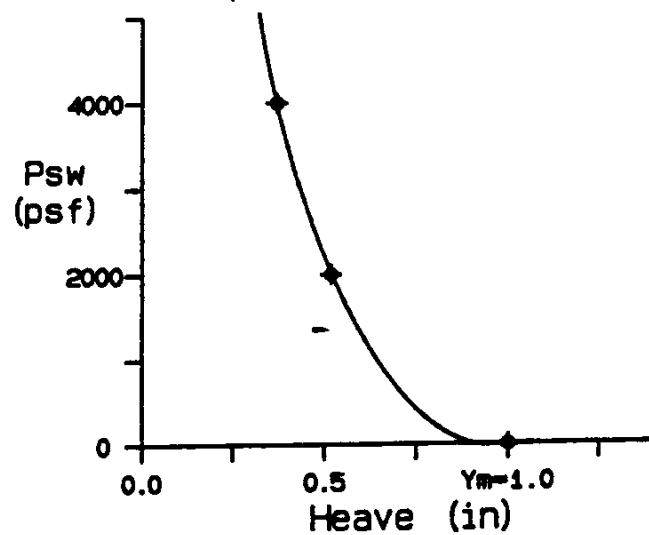
## 13. RIB D3/D4 (ref. Part I - 4.5)

13.1 Interior rib with no wall or column loads

$$A_s \geq .0033 A_g = .0033 \times 12 \times 30 = 1.20 \text{ in}^2 \text{ (top and bot.)}$$

This is the typical minimum reinforcement for the full length of all ribs.

## 14. HEAVE VERSUS SWELL PRESSURE CURVE (ref. Appendix A - 2.1)



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
SOUTHWESTERN DIVISION, CORPS OF ENGINEERS  
1114 COMMERCE STREET  
DALLAS, TEXAS 75242-0216

16 APR 1987

SWDED-G

SUBJECT: Criteria for Developing Geotechnical Design Parameter  
for SWD Ribbed Mat Design Methodology

Commander, Albuquerque District, ATTN: SWAED-TA  
Commander, Fort Worth District, ATTN: SWFED-F  
Commander, Galveston District, ATTN: SWGED-G  
Commander, Little Rock District, ATTN: SWLED-G  
Commander, Tulsa District, ATTN: SWTED-G

1. Reference is made to criteria letter SWDED-TS/G dated 23 December 1986, subject "Design Criteria for Ribbed Mat Foundation".

2. The above reference criteria letter require certain geotechnical parameters be furnished in the Foundation Design Analysis when a ribbed mat slab foundation is recommended in expansive soil areas. Enclosure 1, for addressees only, provides guidance for development of these parameters. These procedures were developed by the Ft. Worth District with review in the Southwestern Division. Questions and/or comments should be directed to either Mr. A.L. Branch, FTS 334-2117 or Mr. Jack Fletcher, FTS 729-6365.

FOR THE COMMANDER:

Encl

*William D. Denys*  
for ARTHUR D. DENYS, P.E.  
Chief, Engineering Division

XV

7-12

40 YEARS OF SERVICE

THE SOUTHWEST

## CONTENTS

1. REFERENCES
2. BACKGROUND
3. SOIL-STRUCTURE INTERACTION MODES
  - 3.1. Center Lift
  - 3.2. Edge Lift
4. DETERMINATION OF CENTER LIFT AND EDGE LIFT PARAMETER FOR STRUCTURAL DESIGN
  - 4.1. Center Lift
    - 4.1.1. Modulus of Subgrade Reaction
    - 4.1.2. Design Allowable Bearing Pressure
    - 4.1.3. Center Lift Heave Potential
    - 4.1.4. Loss of Support Distance
  - 4.2. Edge Lift
    - 4.2.1. Modulus of Subgrade Reaction
    - 4.2.2. Soil-Beam Interface Pressure
    - 4.2.3. Edge Moisture Variation Distance
  - 4.3 Summary
5. APPENDIX A
  - 5.1 EXAMPLE PROBLEM

DEVELOPMENT OF GEOTECHNICAL DESIGN  
PARAMETERS FOR RIBBED MAT FOUNDATIONS

1. REFERENCE.

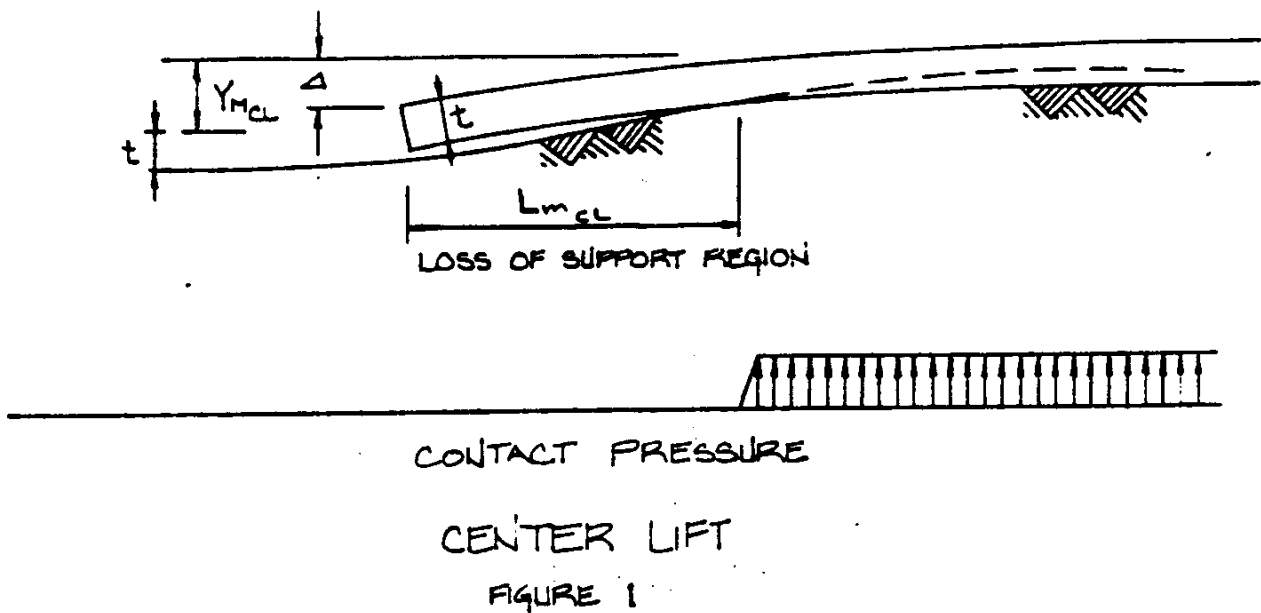
1.1 SWDED-TS/G, Design Criteria for Ribbed Mat Foundations, dated 23 Dec 86.

1.2 TM 5-818-7. Foundations in Expansive Soils, Corps of Engineers, 1983.

2. BACKGROUND. The recently developed structural design methodology (reference 1) models the interaction of a ribbed mat slab on an expansive subgrade for purposes of structural design. This method appears equally suited to stiffened mat systems such as flat mats, modified flat mats and inverted ribbed mats. Utilization of the methodology requires the expansion and refinement of the geotechnical design parameters furnished in the foundation design analysis. The purpose of this report is to (1) identify and (2) provide a rational method of determining these parameters.

3. SOIL-STRUCTURE INTERACTION MODES. Two heave induced deformation conditions appropriate for ribbed mat slab structural analysis are (a) center lift and (b) edge lift.

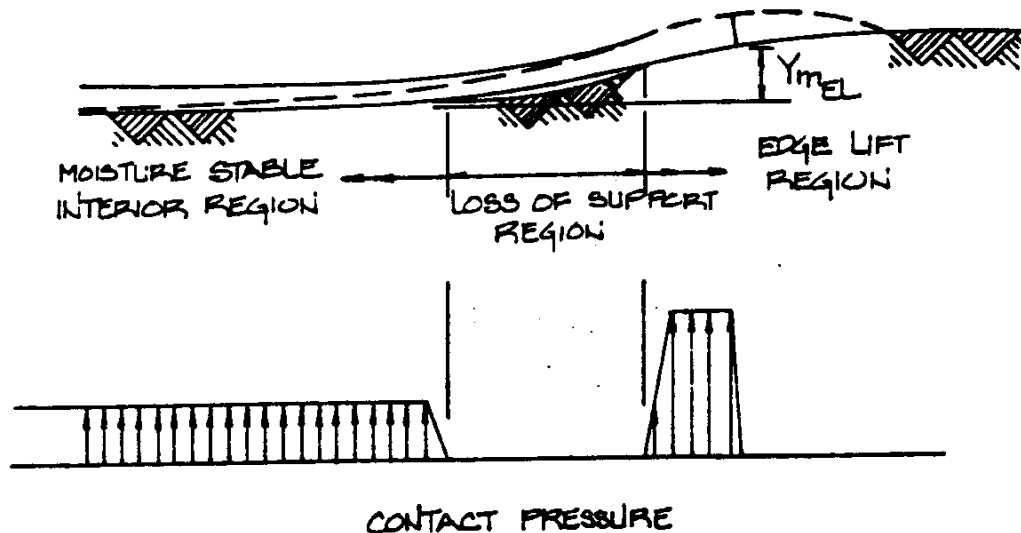
3.1 CENTER LIFT. Center lift considers doming of the foundation in the interior region of a slab on grade differentially to the perimeter region as depicted on figure 1. This may be caused either by drying of the expansive subgrade around the perimeter beam or by wetting of the dry expansive subgrade in the interior region. Perimeter drying results from (1) below average precipitation and/or (2) reduced or no landscape watering and/or



(3) removal of old paving or hard stand. Interior wetting results from (1) disruption of the site moisture equilibrium by "capping" the site with the relatively impervious slab or by removal of thick brush or trees from the site (thus eliminating evapo-transportation) and/or (2) leaky inservice or abandoned utilities. Loss of support along perimeter and first interior transverse stiffener beam results if (1) the magnitude of center lift heave is large enough and (2) the beams are sufficiently rigid to cantilever from the supported interior region.

3.2 EDGE LIFT. Edge lift involves more complex soil-structure interactions than does center lift. In edge lift, the structure is supported by heaving subgrade in the perimeter region and in the relatively moisture stable interior region. Loss of support develops when (1) the edge lift heave deformation

is large enough and (2) the spanning beam is sufficiently rigid. Edge lift mode is depicted on figure 2.



EDGE LIFT  
FIGURE 2

Soil-structure interaction within the interior supported region is reasonably represented as a beam on non-linear subgrade. Soil-structure interaction in the perimeter region is somewhat more complex because the soil deflects under the structural load as a beam on non-linear subgrade, but also the swelling soil either loads and/or deflects the beam upward. To further complicate matters, the amount of edge lift heave and the soil-beam interface pressure are interrelated and unique for each specific site. Background parameter studies for reference 1 indicate that the structural analyses are particularly sensitive

to edge lift parameters (edge lift heave magnitude and limiting beam-soil interface pressure). For example, large values for these may cause the solution to either fail to converge or indicate that the beam must be very deep and/or very heavily reinforced. While site conditions may sometimes dictate massive, very rigid stiffener beams, this is not generally the case. Generally, edge lift heave of less than 1.0 to 1.5 inches used in the design method given in reference 1 produce reasonable, constructable beams.

#### 4. DETERMINATION OF CENTER LIFT AND EDGE LIFT PARAMETERS FOR STRUCTURAL DESIGN.

4.1 CENTER LIFT - Center lift parameters to be provided in the foundation design analysis includes (1) modulus of subgrade reaction ( $K_1$ ), (2) design allowable bearing for beams ( $q_{all}$ ), (3) magnitude of center lift ( $Y_{mcl}$ ) and (4) loss of support distance around the perimeter ( $L_{mcl}$ ).

4.1.1 MODULUS OF SUBGRADE REACTION - The modulus of subgrade reaction should be taken as  $K_1 = 200$  pci for beams up to 12 inches wide bearing on compacted, nonexpansive fill. Higher values may be justified for granular nonexpansive fills consisting of gravel, crushed rock or limestone screenings or for cement stabilized materials if these materials extend significantly ( $D \geq 3B$ ) below the stiffener beam of width  $B$ . The foundation design analysis should direct that  $K_1$  values be factored to account for width effects such that  $K_{design} = K_1/B$ , where  $B$  is the effective beam width in feet for soil structure interaction. Note that the resultant effective beam width may include a significant width of the slab and is therefore

significantly greater than actual beam width. Studies indicate that significant load distribution occurs over an "effective" width of approximately five. It should be noted that structural design calculations are not sensitive to K value.

4.1.2 DESIGN ALLOWABLE BEARING. A design allowable bearing value ( $q_{all}$ ) has historically been assigned for sizing of stiffener beams, perimeter beams and enlarged beam intersections beneath columns. Values are typically given considering the beam to be a continuous strip footing or the beam intersection to be a spot footing (carrying either line or concentrated loads, respectively). The allowable bearing value is typically developed based on the average strength of engineered fill at shallow depth with a factor of safety of not less than 3.0. Design loads typically include full dead load plus half live load. The purpose in sizing the beams and beam intersections for this design allowable is to provide uniform contact pressures at the beam-soil interface therefore limiting inservice differential settlement. The assumptions of minimal load sharing between the slab and beams, ample safety factor on the fill strength, and minimum beam widths specified in the SWD EIM combine to limit the mobilized soil strains to low levels. This leads to very small structurally induced deflections given uniform, nominal fill depths. Actual values assigned for design bearing allowables have seldom exceeded  $q_{all} = 2.0$  KSF although values as high as 3.0 KSF have been assigned in limited cases where required and justifiable. Seldom are there structural requirements for larger allowables bearing values since specified minimum beam widths generally govern.



4.1.3 MAGNITUDE OF CENTER LIFT HEAVE POTENTIAL. - The magnitude of center lift heave potential ( $Y_{mcl}$ ) given in the foundation design analysis should be the residual heave potential at the site. The value of  $Y_{mcl}$  should include effects due to subgrade removal and replacement criteria, any surcharge effects due to fill above original subgrade and the weight of the proposed structure. Maximum design value for center lift potential should not exceed 1.5 inches. Where attainable with reasonable removal/replacement depths ( $\leq 36$  inches), it is desirable to limit  $Y_{mcl}$  to not more than 1.0 inch, which is well within the "tolerable" inservice deformation range of most structures. Minimum remove/replace depth should be taken to the bottom elevation of the ribbed mat slab beams.

function  
of  
Anticipated  
Loads

The heave potential is determined by three soil parameters: the coefficient of swell ( $C_s$ ), depth of active zone ( $X_a$ ) and expansion pressure ( $P_{exp}$ ).

Caution should be used in selecting coefficient of swell ( $C_s$ ) values for heave analyses since swell pressure test results significantly underestimate  $C_s$  values compared to controlled expansion-consolidation-rebound tests. Additionally, both test methods tend to give low  $C_s$  values since most rebound time curves are terminated well before primary swell is completed.

★ An appropriate design value of the depth of the active zone ( $X_a$ ) typically lies between the present depth to the stable relative moisture content (estimated by observing the relationship of moisture content to the plastic limit) and the maximum depth observed, such as the maximum depth of weathering. Typical  $X_a$  values for the central and north Texas regions and

central Oklahoma region appear to vary from about 10 to 15 feet. These values have been estimated for (1) regression heave analyses for distressed structures and (2) depth of moisture variation versus approximate return/duration interval studies. Values smaller than 14 feet may be applicable in specific cases such as where the active zone is the distance between the structural foundation element or slab on grade and a perched water table; a condition common in these regions.

Center lift heave analyses should consider "saturated" conditions to a depth of  $X_a$ . If a nominal remove/replace depth and saturated subgrade assumptions indicate unreasonable residual heave potential, consider increasing the depth of remove/replace and/or recommending a more defensive design to prevent saturation of the subgrade.

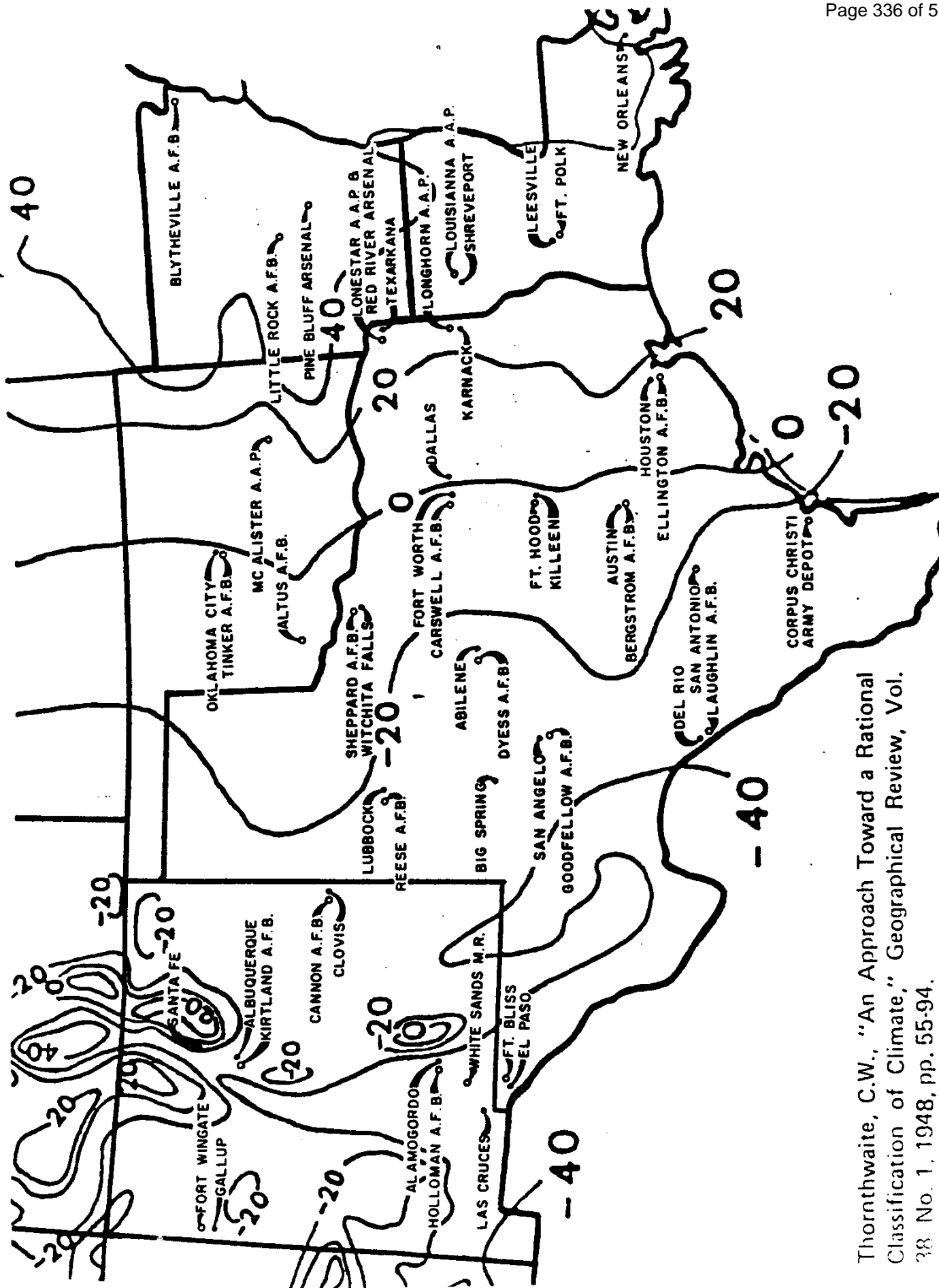
Expansion pressures should be developed versus depth using small depth intervals. These should be developed from laboratory data for the site. Additionally, these may be supplemented using proper correlations with nearby, preferably adjacent sites.

4.1.4 EDGE MOISTURE VARIATION DISTANCE. The edge moisture variation distance ( $L_{mcl}$ ) may control the design of interior stiffener beams which are adjacent to the perimeter. The maximum moments and shear are induced in the transverse beams when these elements cantilever free of foundation support from the interior supported region to the outside of the perimeter beam. The length of cantilver is largely controlled by the value of  $L_{mcl}$ . SWD adopted this concept from Post-Tensioning Institute (PTI) guidelines, originally developed for lightly loaded flexible mats in the late 1970's and early 1980's. Standard practice in the

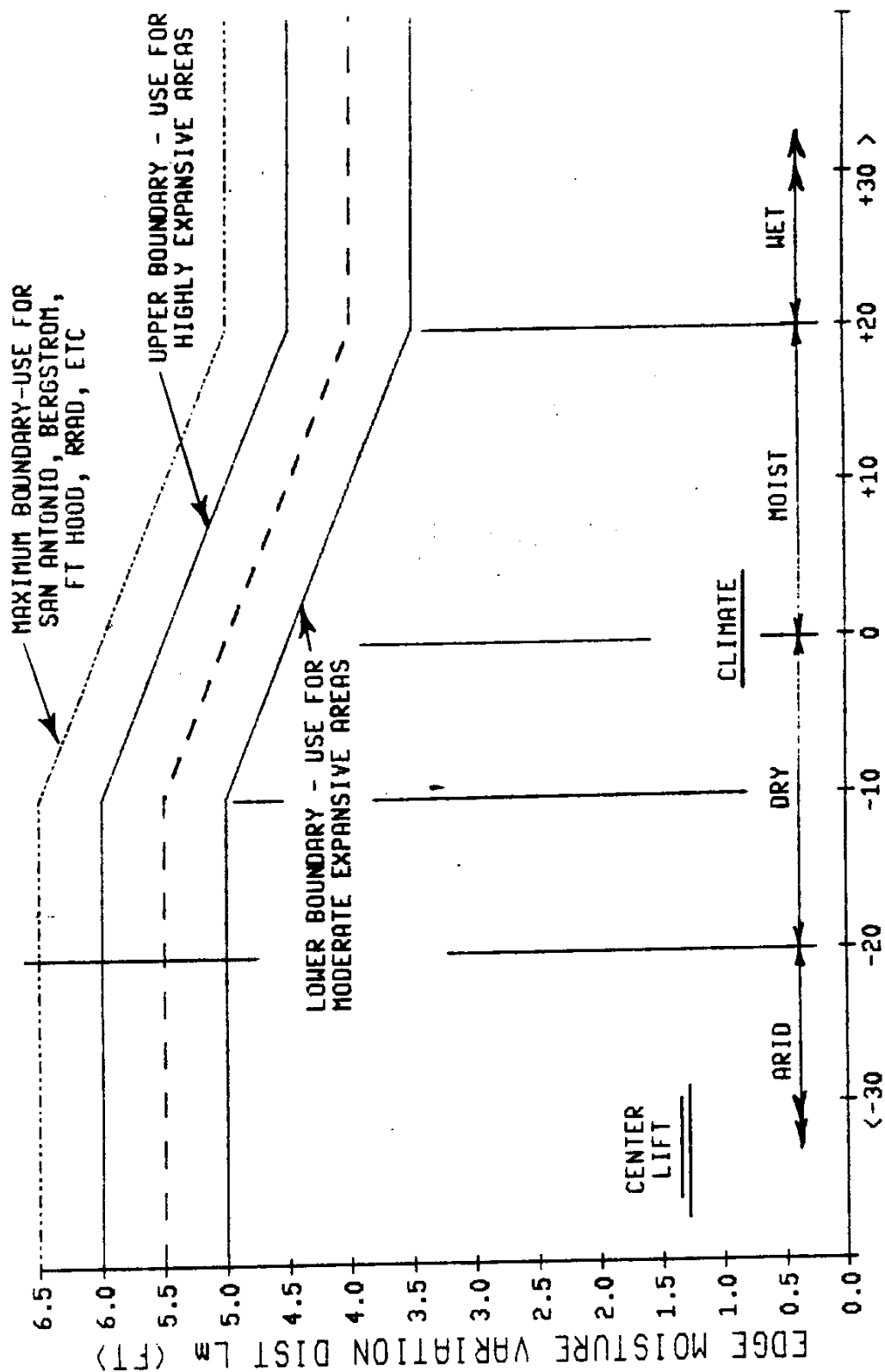
San Antonio area has been to assign upper or near upper bound values from TMI for design LmCL values. At least two aspects of designs probably tend to moderate the actual edge moisture variation distance experienced; these being (1) relatively deep perimeter beams which act as a physical barrier and (2) the non-expansive fill blanket which tends to make changes in moisture content (and therefore any resultant heave or shrinkage) more uniform and provide a surcharge effect as well. Other factors, however, tend to offset these moderating effects. These include very short return interval of edge moisture variation events presented in TMI (reported by some sources to range from 1 to 2 years). Typical project design life of projects exceeds 20 or 30 years and, since we're still using many World War II facilities, it may well exceed 50 years. Estimated edge moisture variation values considering a 100 percent probability of experiencing a 20 to 30-year return interval event may well be twice typical TMI values.

Based on a subjective combination of all factors, it is suggested that LmCL be taken as the edge moisture variation distance determined using figures 3 and 4. These values should be modified, either up or down, based on site specific soils investigations and engineering judgement.

4.2 EDGE LIFT - Edge lift parameters to be provided in the foundation design analysis include (1) modulus of subgrade reaction ( $K_1$ ), (2) magnitude of edge lift heave ( $Y_{mEL}$ ), (3) limiting soil-beam interface pressure ( $P_{sw}$ ) for that portion of the beam being acted on by the heaving subgrade and (4) a value for edge moisture variation distance ( $L_{mEL}$ ).



Thornthwaite, C.W., "An Approach Toward a Rational Classification of Climate," Geographical Review, Vol. 38 No. 1, 1948, pp. 55-94.



APPROXIMATE RELATIONSHIP BETWEEN THORNTHWAITE INDEX AND MOISTURE VARIATION DISTANCE

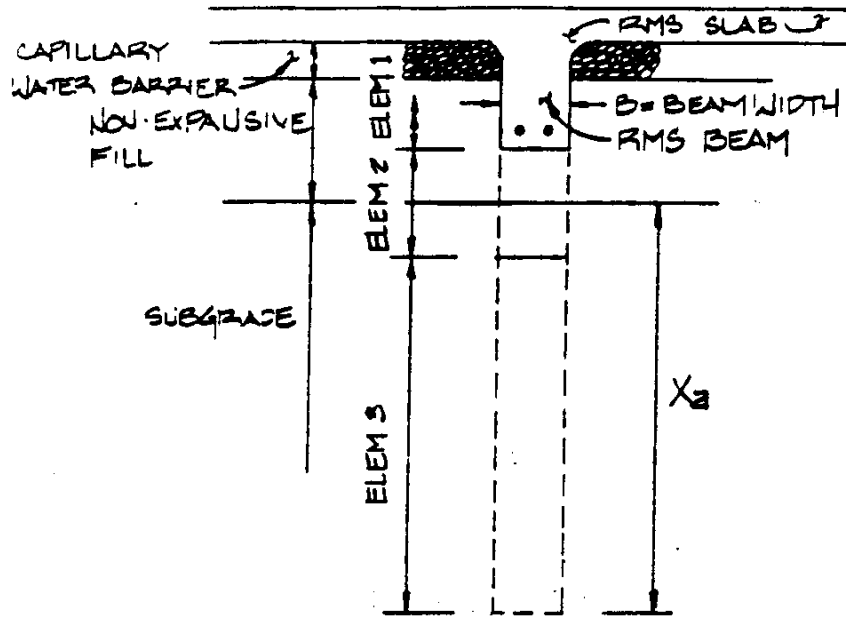
FIGURE 4

4.2.1 MODULUS OF SUBGRADE REACTION. - Values given for center lift are considered appropriate for edge lift also.  $K_1 = 200 \text{ pci}$

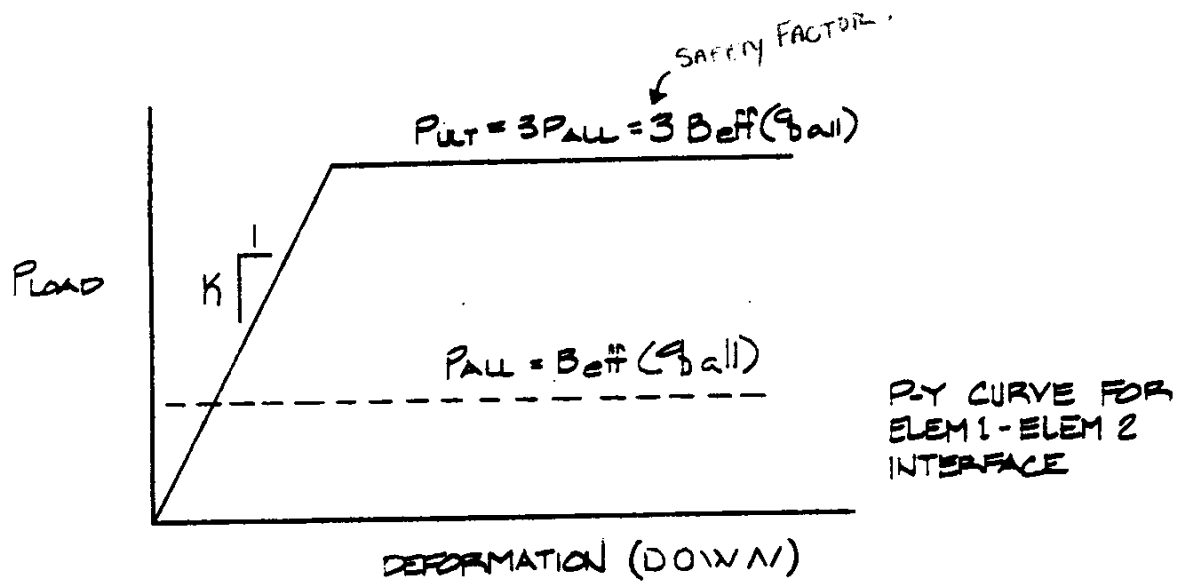
4.2.2 SOIL-BEAM INTERFACE PRESSURE. Discussion of both limiting soil-beam interface pressure and magnitude of edge lift heave parameters ( $P_{sw}$  and  $Y_{mL}$ ) are best handled concurrently since both are intimately related and the analysis necessary for solution determines both simultaneously.

The area of soil-beam contact in the swelling perimeter region involves a somewhat complex soil-structure interaction situation. As edge lift develops and loss of support occurs between the perimeter and interior regions, the heaving soil may well exert a pressure on the stiffener beams well in excess of typical design interface pressures ( $q_{all}$ ). As the soil column swells and lifts the overlying beam, the soil-beam contact area increases toward the interior region to accommodate the greater structural reaction.

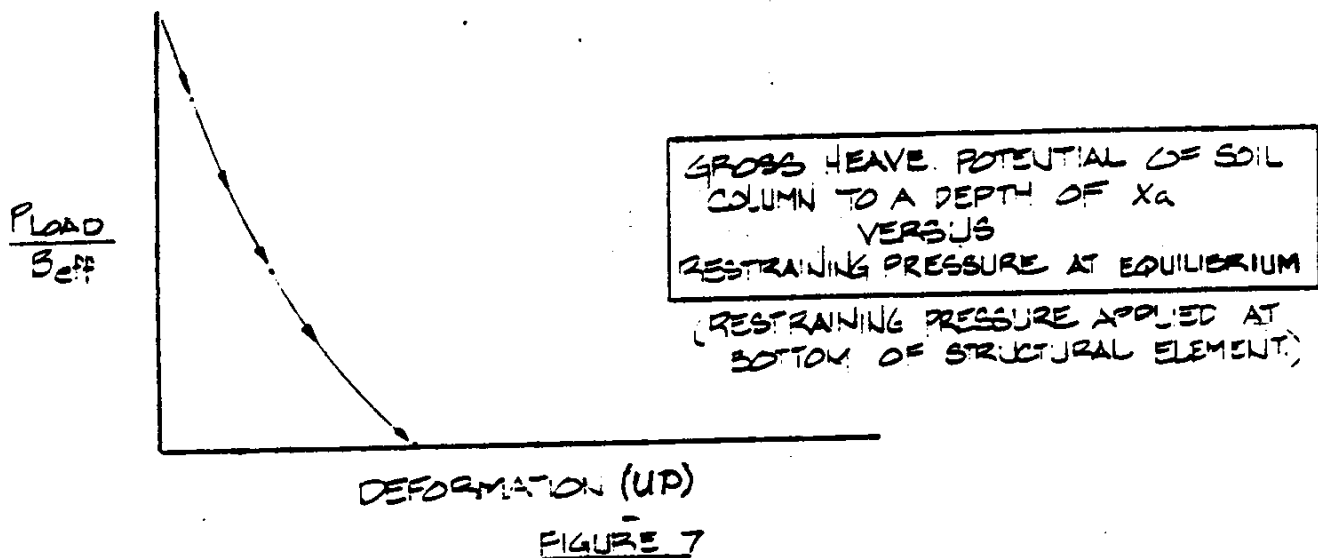
The soil-structure interaction in the edge lift region can be visualized as a three-component system; (1) a structural element (a beam or mat strip), (2) an element of nonexpansive fill beneath the structural element plus that piece of the expansive subgrade restrained against heave by the weight of the overlying fill and the stresses induced beneath the structural element, and (3) the heaving column of soil to a depth of  $X_a$  beneath the bottom of the nonexpansive fill blanket (figure 5).

FIGURE 3

The load-deformation relationship of element 1 interacting with element 2 can be represented by a P-Y curve shown in figure 6.

FIGURE 6

The load-deformation relationship of element 3 interacting with elements 1 and 2 in the column immediately below the beam as shown on figure 7. The plot consists of the net heave potential of the swelling soil column versus those forces resisting the tendency to swell, taken at the base of the structural beam.



These relationships can be added algebraically to produce a composite p-y curve which can be easily utilized by available soil-structure interaction programs for structural analysis. Since such analysis is within the purview of the structural engineer, the geotechnical engineer need only furnish the pressure heave relationship in useable form in the Foundation Design Analysis. It is suggested that this information be provided in a tabulated format giving coordinates for at least three points. These minimum three points should be the  $P_{sw}$  and  $Y_{mbl}$  coordinates for (1) pressure equal to  $P_{ult}$ , (2) pressure equal to  $P_{all}$  and (3) pressure equal to zero.

$P_{ult} = F.S. \times P_{allow}$



4.2.3 EDGE MOISTURE VARIATION DISTANCE. Edge moisture variation distance ( $L_{m\&L}$ ) appropriate for edge lift analysis may be taken from the TMI chart given in figure 8.

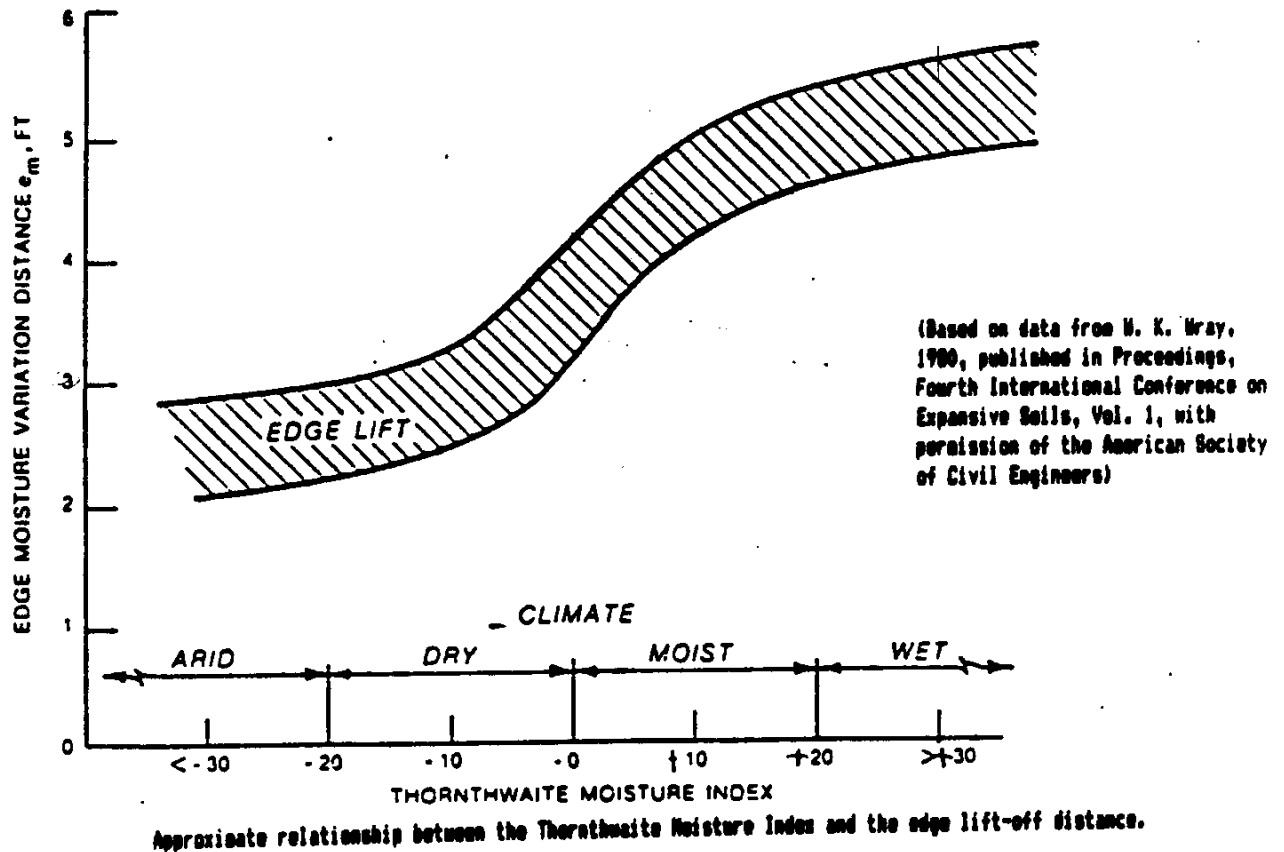


FIGURE 8

The TMI values represent approximate environmentally induced events. As a result, upper bound values should be selected for design. It is recommended, however, that average values be used for all SWD projects. Additionally, recommendations should be made in the foundation design analysis to limit the potential for developing "hot spots" due to long term sources of free water around the building perimeter.

*function of the type of bldg, ie, Back Street or Not*

4.3 Certain structure-site situations may well warrant deleting edge lift analyses as follows:

4.3.1 Where the proposed structure is a pre-engineered metal building without interior masonry walls or heavy interior dead or permanent live loads.

4.3.2 Where defensive design efforts have been incorporated and reasonable confidence exists that these will be constructed and maintained as intended.

4.3.3 Where minor architectural distress (such as cracking of masonry walls, plaster walls, tiled surfaces) is not likely to cause undue user concern or raise inservice maintenance requirements significantly.

## 5. APPENDIX A

5.1 EXAMPLE PROBLEM. An example problem is provided in Appendix A.

**APPENDIX A**

**EXAMPLE PROBLEM**

1. **Required.** - Develop geotechnical parameters for the structural design of a ribbed mat slab given the following:

a. **Proposed Structure.** - Office/Administration type structure located in San Antonio, Texas, 60X150 feet in plan. The structure is to consist of double wythe masonry (face brick over CMU) load bearing exterior walls and isolated interior columns at 20 ft. centers.

b. **Proposed Site.** - One acre, minimal topographic relief, site covered with mesquite trees.

c. **Subsurface Conditions.** - Drilling program (5 borings) indicates the foundation materials consist of (1) a surface stratum of high plasticity clay grading into medium plasticity clay with depth to a total thickness of 14 feet, (2) a water bearing sand and gravel stratum from 1 to 7 feet thick overlying, (3) an expansive clay shale formation.

d. **Summary Laboratory Test Data.** -

Stratum	Depth (ft)	USCS	$\bar{w}_o$ (%)	$\gamma$ (pcf)	LL	PI	$P_{exp}$ (tsf) (net)	$C_s$	$C_c$	$C_u$ (ts)
1	0-4	CH	25	105	65	45	0.8 -1.0	0.06	0.02	0.
2	4-14	CL	14	108	44	30	0.6	0.06	0.18	0.
3	14-20	GC	6	-	25	12	0	-	-	50 B/
4	20 plus	Wea. Clay Shale	22	110	70	52	2.0	0.09	0.22	1.

2. Determine Parameters Required for Center Lift Analysis:

a. Modulus of Subgrade Reaction ( $K_1$ ). - Mat slab will be founded on nonexpansive fill, therefore it is reasonable to assign a value of  $K_1 = 200$  PCI. The structural engineer should factor this value based on effective beam width such that  $K_{design} = K_1 (1ft/B_{eff}, ft)$ .

b. Design Bearing Allowable ( $q_{all}$ ). - Since beams will be supported on nonexpansive fill and the building loads will range from light to moderate, it appears that a design bearing allowable of  $q_{all} = 2.0$  KSF is appropriate.

c. Magnitude of Center Lift Heave Potential ( $Y_{acl}$ ). -

(a) Calculate site heave potential

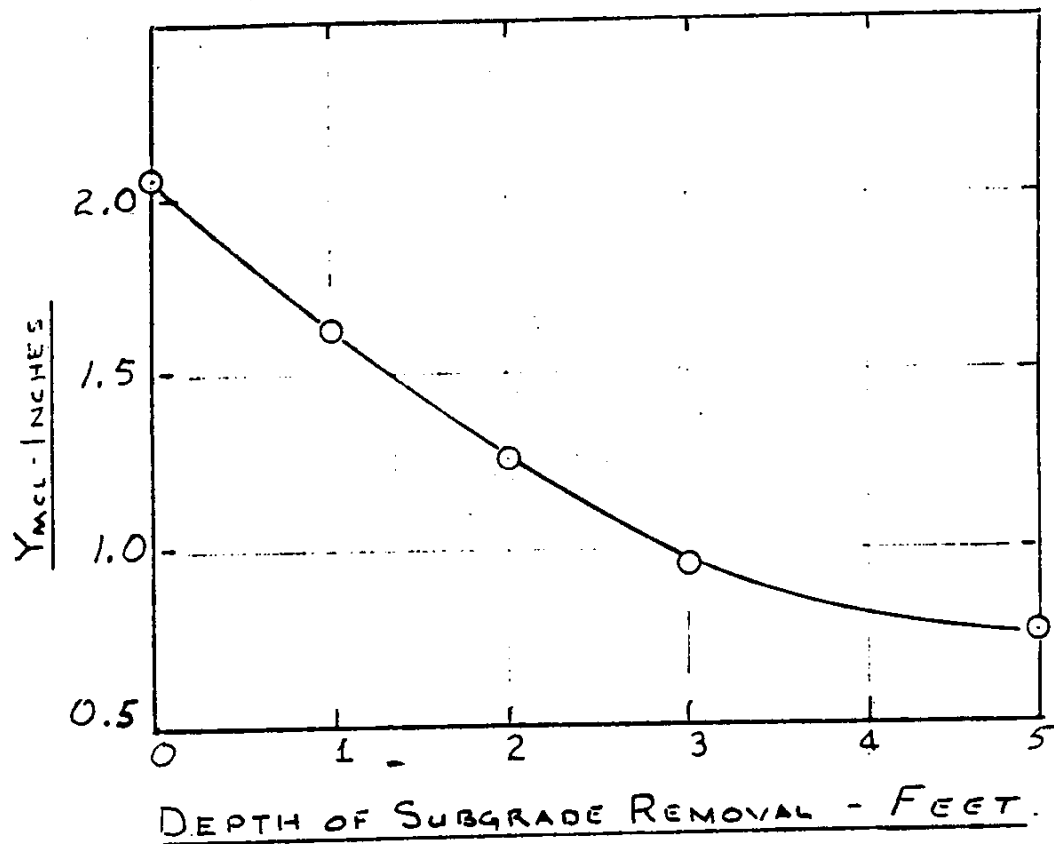
Given:  $C_s = 0.06$ ,  $e_o = 0.60$ ,  $P_o$  = effective overburden pressure,  $P_{exp}$  = gross swell pressure,  $P_f$  = effective pressure resisting heave beneath mat including  $P_o$ , {surcharge due to fill and structural dead load,  $h_u$  = heave for soil layer  $h$  inches thick, and an  $X_a = 10$  feet.

$$C_s = .06$$

$$e_o = .60$$

$z$ (ft)	$z$ (ft)	$P_o$ (tsf)	$P_{exp}$ (tsf)	$P_r$ (tsf)	$h$ (in)	$h_r = \frac{C_{sh}}{1 + e_o} \log_{10} \frac{P_{exp}}{P_r}$ (inches)	$h_r$ (bottom to top) (inches)
0-1	0.5	0.03	1.0	$\frac{.07 + .03}{.07 + .1}$ 0.1	12	0.45	2.07
1-2	1.5	0.1	1.0	0.17	12	0.35	1.62
2-3	2.5	0.17	1.1	$\frac{.07 + .17}{.07 + .17}$ 0.24	12	0.30	1.27
3-4	3.5	0.23	0.8	0.3	12	0.19	0.97
4-6	5	0.33	0.9	0.4	24	0.31	0.78
6-8	7	0.46	1.0	0.53	24	0.25	0.47
8-10	9	0.6	1.2	0.67	24	0.22	0.22
10-12	11	0.73	1.35	0.8	24	0.2	N/A
12-14	13	0.86	0.9	0.93	24	N/A	N/A

Determine required depth of subgrade replacement and residual heave potential after replacement with nonexpansive fill. A plot of replacement depth versus residual heave taken from the above table follows:



Removal and replacement to 3.0 feet will reduce the heave potential to approximately 1.0 inch, thus  $Y_{mcl} = 1.0$  inch. Note that significant additional removal would be required to reduce the residual heave potential any significant additional amount.

d. Edge Moisture Variation Distance ( $L_{mc1}$ ) - taken from figures 3 and 4 as  $L_{mc1} = 6.5$  feet.

3. Determine parameters required for Edge Lift analyses:

a. Modulus of Subgrade Reaction ( $K_1$ ). - Same as for Center Lift.

b. Design Allowable Bearing ( $q_{all}$ ). - Same as for Center Lift.

c. Soil - Beam Interface Pressure ( $P_{sw}$ ) and Magnitude of Edge Lift Heave Potential ( $Y_{me1}$ ). -

Determine the residual heave potential for the soil column beneath a typical beam for a range of assumed interface pressures.

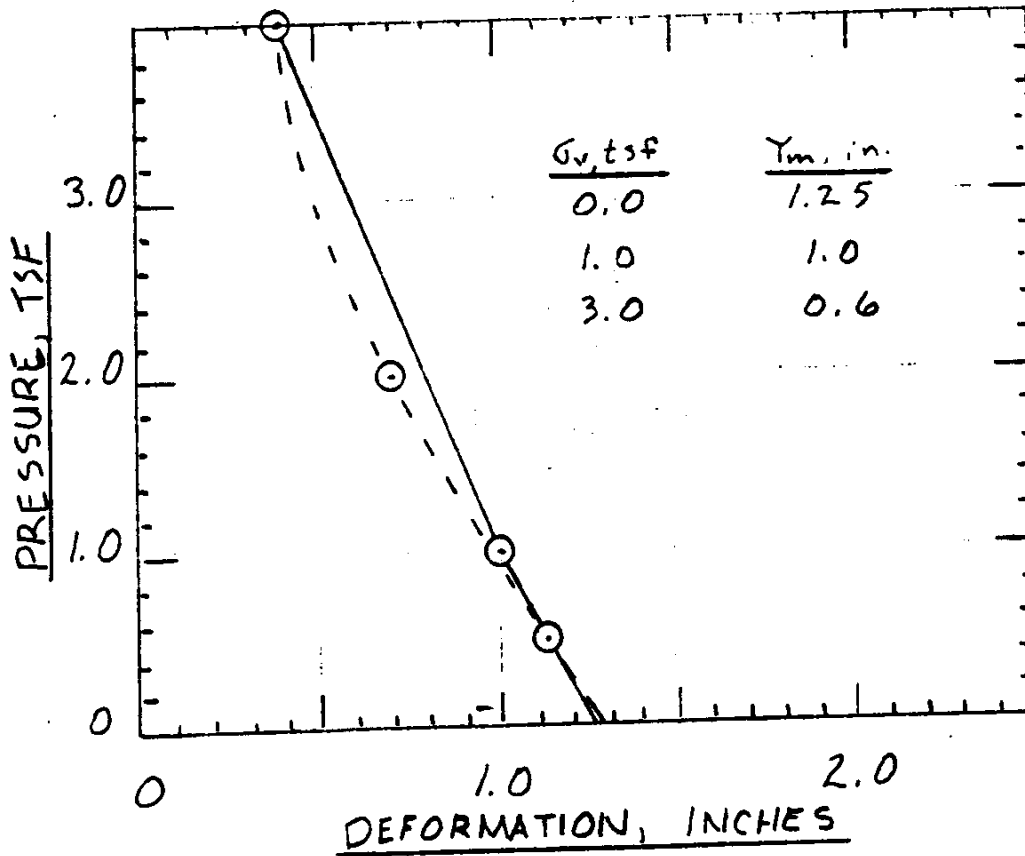
A summary of calculations and results is presented in tabulated form on page 6. A plot of soil-beam interface pressure versus heave potential is shown on page 7. A reasonable bilinear representation of the results, for use by the structural engineer, can be developed assuming a linear relationship between the following points:

<u><math>P_{sw}</math>, TSF</u>	<u><math>Y_{me1}</math>, Inches</u>
0.0	$Y_{me1} = 1.25$
$q_{all} = 1.00$	$Y_{me1} = 1.0$
$q_{ult} = 3(q_{all}) = 3.00$	$Y_{me1} = 0.6$

d. Edge Moisture Variation Distance ( $L_{me1}$ ). The edge moisture variation distance is taken from figure 8 as  $L_{me1} = 3.0$  feet.







EDGE LIFT PARAMETER

EXAMPLE PROBLEM

<b>Project No.:</b> 101228.01					<b>UNIT OPERATIONS FACILITIES COF SITE FORT POLK, LA.</b>		LOCATION: Ft. Polk, La.
<b>Updated:</b> 7/14/10							Submittal: 70% Draft RFP X Due Date: July 16, 2010 Remarks:
DRAWING FILE NAME	CALS FILE NAME	SEQ. NO.	SHEET NO.	SHEET TITLE			
fpcofg-000cvr				COVER SHEET			
fpcofg-001plm		1	G-001	PROJECT LOCATION PLAN	X		
fpcofb-101blx		2	B-101	BORING LOCATIONS	X		
fpcofb-201lb1		3	B-201	LOGS OF BORING 1 OF 2	X		
fpcofb-202lb2		4	B-202	LOGS OF BORING 2 OF 2	X		
fpcofv-101sh1		5	V-101	TOPOGRAPHICAL SURVEY SHEET 1 OF 4	X		
fpcofv-102sh2		6	V-102	TOPOGRAPHICAL SURVEY SHEET 2 OF 4	X		
fpcofv-103sh3		7	V-103	TOPOGRAPHICAL SURVEY SHEET 3 OF 4	X		
fpcofv-104sh4		8	V-104	TOPOGRAPHICAL SURVEY SHEET 4 OF 4	X		
fpcofc-101dem		9	C-101	SITE DEMOLITION PLAN	X		
fpcofc-102lay		10	C-102	SITE LAYOUT PLAN	X		
fpcofc-103pav		11	C-103	PAVING PLAN	X		
fpcofc-104utl		12	C-104	UTILITY SITE PLAN	X		
fpcofc-501pdx		13	C-501	PAVING DETAILS	X		
fpcofc-502udx		14	C-502	UTILITY DETAILS	X		
fpcofc-503ddx		15	C-503	DRAINAGE DETAILS	X		
fpcofc-504sdx		16	C-504	SANITARY SEWER DETAILS	X		
fpcofc-505dm1		17	C-505	HANDICAPPED PARKING PLAN AND DETAILS	X		
fpcofc-506dm2		18	C-506	DUMPSTER ENCLOSURE PLAN AND DETAILS	X		
fpcofc-507pbd		19	C-507	REMOVABLE PIPE BOLLARDS DETAILS	X		
fpcofc-508ecd		20	C-508	TEMPORARY EROSION SEDIMENT AND WATER POLLUTION CONTROL MEASURES	X		
fpcofes-101esp		21	ES-101	ELECTRICAL/COMMUNICATIONS SITE PLAN	X		

## APPENDIX C Utility Connections

Not Used

## APPENDIX D

### Results of Fire Flow Tests

Fire Hydrant 35-3 Hydraulic parameters

(Tested on August 3, 2010)

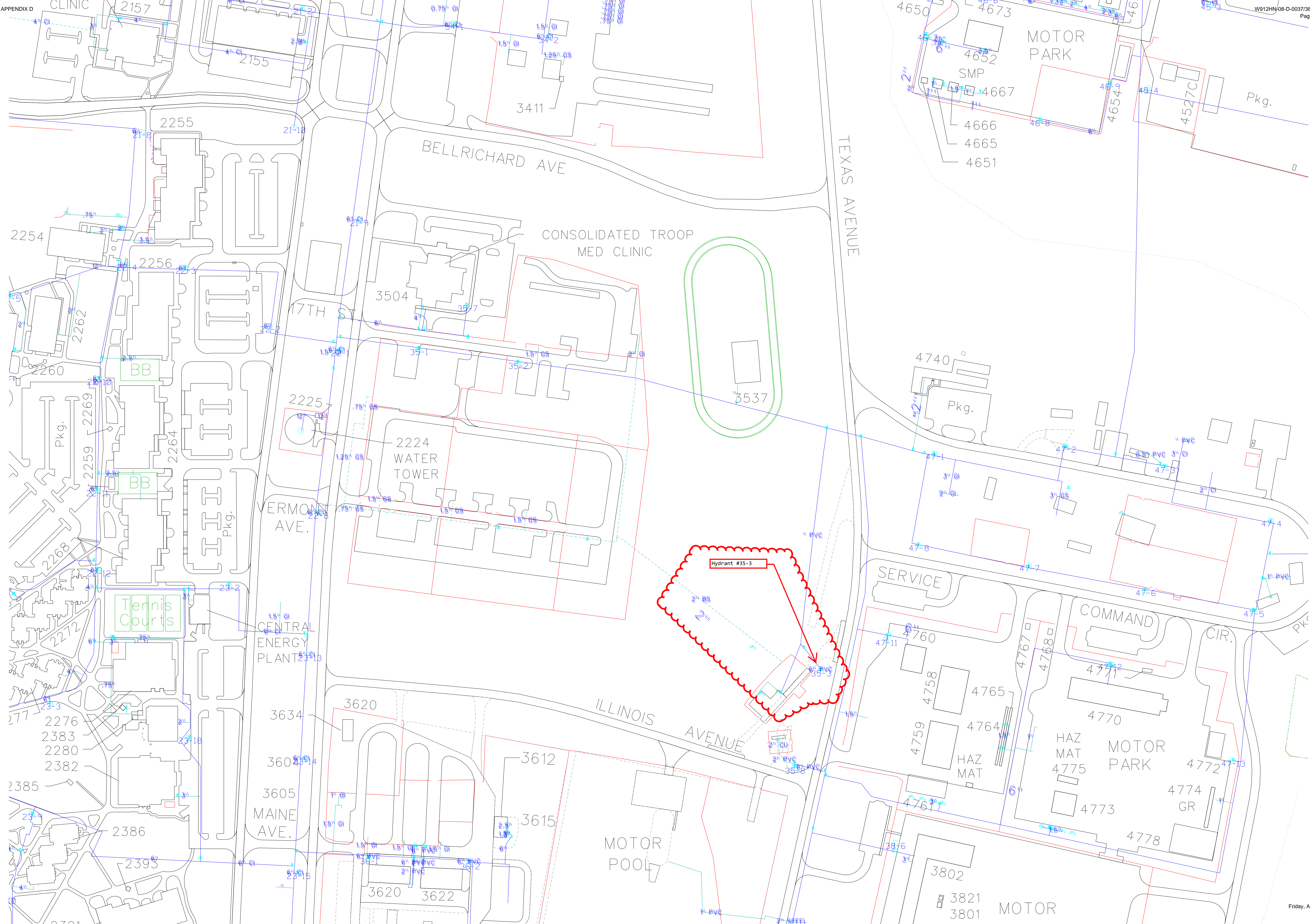
Static Pressure: 80 psi

Residual Pressure: 70 psi

Flow: 1124 gpm

See map attached for location of fire hydrant. It is located about 100' north of the Texas and Illinois intersection.





## APPENDIX E

### Environmental Information



IMSE-POL-PD (420-1)

February 22, 2010

## MEMORANDUM FOR DPW, ENRMD

SUBJECT: Construction of TEMF and COF Facilities For PN 69199.

1. Request site-specific environmental surveys for NEPA compliance as applicable for subject project.
2. Record of Environmental Consideration (REC) is enclosed for your review and concurrence/non-concurrence. Request a copy of the enclosed REC with concurrence/non-concurrence be returned to this office.
3. Point of contact is Dwight Durrett, DPW Planning Division, 531-6617.



SCOTTY GOINS  
Chief, Planning Division

Encl  
REC

CY10091

ENRMD Control Number

Friday, April 29, 2011

DEPARTMENT OF THE ARMY  
JOINT READINESS TRAINING CENTER AND FORT POLK  
FORT POLK, LOUISIANA 71459

RECORD OF ENVIRONMENTAL CONSIDERATION

**To: Environmental Officer**

**From: DPW Planning Division**

1. **Project Title:** Construction of TEMF and COF facilities to support Unit Ops PN 69199.
2. **Brief Description of Proposed Action:** Construct a Tactical Equipment Maintenance Facility (TEMF) and a Company Operations Facility (COF) to support Fort Polk Unit Operations, Project Number 69199. These facilities are needed to provide required maintenance and operations space. Project construction will include site preparation (i.e. clearing, grading, drainage work, demolition, etc.) and installation of utilities (i.e. electrical, communication, etc.) for the structures. During site preparation and prior to construction, vegetation may need to be removed. Any vegetative debris will be properly removed from the construction site and/or possibly burned on site, dependent on the type and/or amount of debris. In addition to the construction of the buildings, site preparation, and installation of utilities, this construction project will also include construction of various supporting facilities/structures (i.e. paving, fencing, parking lot, etc.). The contractor awarded the project will be required (and this requirement will be placed in the Scope of Work) to obtain appropriate permits and/or necessary approvals associated with and required for new construction projects, in accordance with State, Federal, and Fort Polk regulations (i.e. submit a Notice of Intent, completion of Storm Water Pollution Prevention Plan prior to any ground disturbance activities, submission of applicable documentation to the Louisiana Department of Environmental Quality, wetland/404 permits, etc.) If the limits of construction exceed the submitted project footprint all construction must stop and the new project footprint must be submitted to the Environmental and Natural Resources Management Division in order for further environmental impacts to be analyzed.

**3. Project Engineer/ Manager Determination:**

Environmental Parameters	YES	NO
Action will require DHH approval of water system changes.		X
Action will require DHH approval of wastewater changes.		X
Project footprint between 1 and 5 acres (storm water permit).		X
Project footprint greater than 5 acres (storm water permit).	X	
Action has the potential to disturb asbestos.		X
Action has the potential to disturb lead based paint.		X

4. **Purpose and Need:** The purpose of the project is to provide needed maintenance and operations space on Fort Polk.
5. **Anticipated Date and/or duration of Proposed Action:** 15 Mar 2010.
6. **A Map or Map(s) are attached:** See attached maps.

CY10091

ENRMD Control Number



- a. Is categorically excluded under the provisions of categorical exclusion (CX) C-1 32 CFR 651, Appendix B [and no extraordinary circumstances exist and there are no adverse effects to sensitive resources, as defined in CFR 651.29(b), 651.29(c)] because: (1) See paragraph 8 below (Effects on the Environment), showing that there are no significant environmental impacts; and (2) this proposed action satisfies the screening conditions in 32 CFR 651.29(a), and meets all screening criteria in 32 CFR 651, Appendix B, Section I.
8. **Effects on the Environment:** The proposed action was evaluated by the proponent and an ENRMD Environmental Subject Matter Expert / Evaluator using the following parameters.



Environmental Parameters	Positive Impact	Negative Impacts	No Significant Impacts	Subject Matter Expert
Air quality			X	See Enclosure #1 + #2
Water quality			X	See Enclosure #3
Water/Waste Water Systems			X	See Enclosure #4
Cultural Resources			X	See Enclosure #5
Does the property qualify as historical property under the National Historic Preservation Act (NHPA)? <u>X</u> no yes (sign name) <u>AST, 23 March 2010</u>				
Natural Resources			X	See Enclosure #6
Endangered Species			X	See Enclosure #7
Noise			X	AST, 23 March 2010
Sensitive plants or bogs			X	See Enclosure #8
Wetlands			X	AST, 23 March 2010
Asbestos			X	See Enclosure #9
Lead based paint			X	See Enclosure #9
Biodiversity			X	AST, 23 March 2010
Solid Waste			X	See Enclosure #10
Hazardous Material \ Waste			X	See Enclosure #10
Toxic Substances			X	AST, 23 March 2010
Environmental Justice			X	
Protection of Children			X	

CY10091

ENRMD Control Number

**9. Coordination with other agencies and installation departments:**

Fill out as many lines as necessary below and delete unused lines

Installation Organization or Other Agency	Coordination Date	Coordinating Person
Coordination with Master Planner	Feb 2010	Scotty Goins

**10. NEPA Specialist survey report is attached as Appendix A. A NEPA staff person will assist you with this.**

**11. Conclusion:** This proposed action has been evaluated in accordance with 32 CFR Part 651. It has been determined that this proposed action does not individually or cumulatively have significant effects on the human or natural environment. There will be no environmentally controversial changes to existing environmental conditions. There are no circumstances which would require an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA). This proposed action: (1) satisfies all screening conditions in 32 CFR 651.29(a); (2) meets all screening criteria in 32 CFR 651, Appendix B, Section I; (3) does not involve any extraordinary circumstances, as defined in 32 CFR 651.29(b), that would preclude the use of a CX; (4) will not adversely affect environmentally sensitive resources as defined in 32 CFR 651.29(c); (5) qualifies for categorical exclusion (CX) number(s) C-1 in accordance with 32 CFR 651, Appendix B, Section II.

**12. Other Environmental Laws:** This document does not relieve the proponent of applicable federal and state laws and regulations.

## Project Proponent

## Installation Environmental Coordinator

Concur / Nonconcur

*[Signature]*  
Dwight Durett  
Community Planner

*[Signature]*  
Charles H. Stagg  
Chief, Environmental and Natural  
Resources Management Division  
Directorate of Public Works

Date: 22 Feb 10Date: 25 March 2010

CY10091

ENRMD Control Number

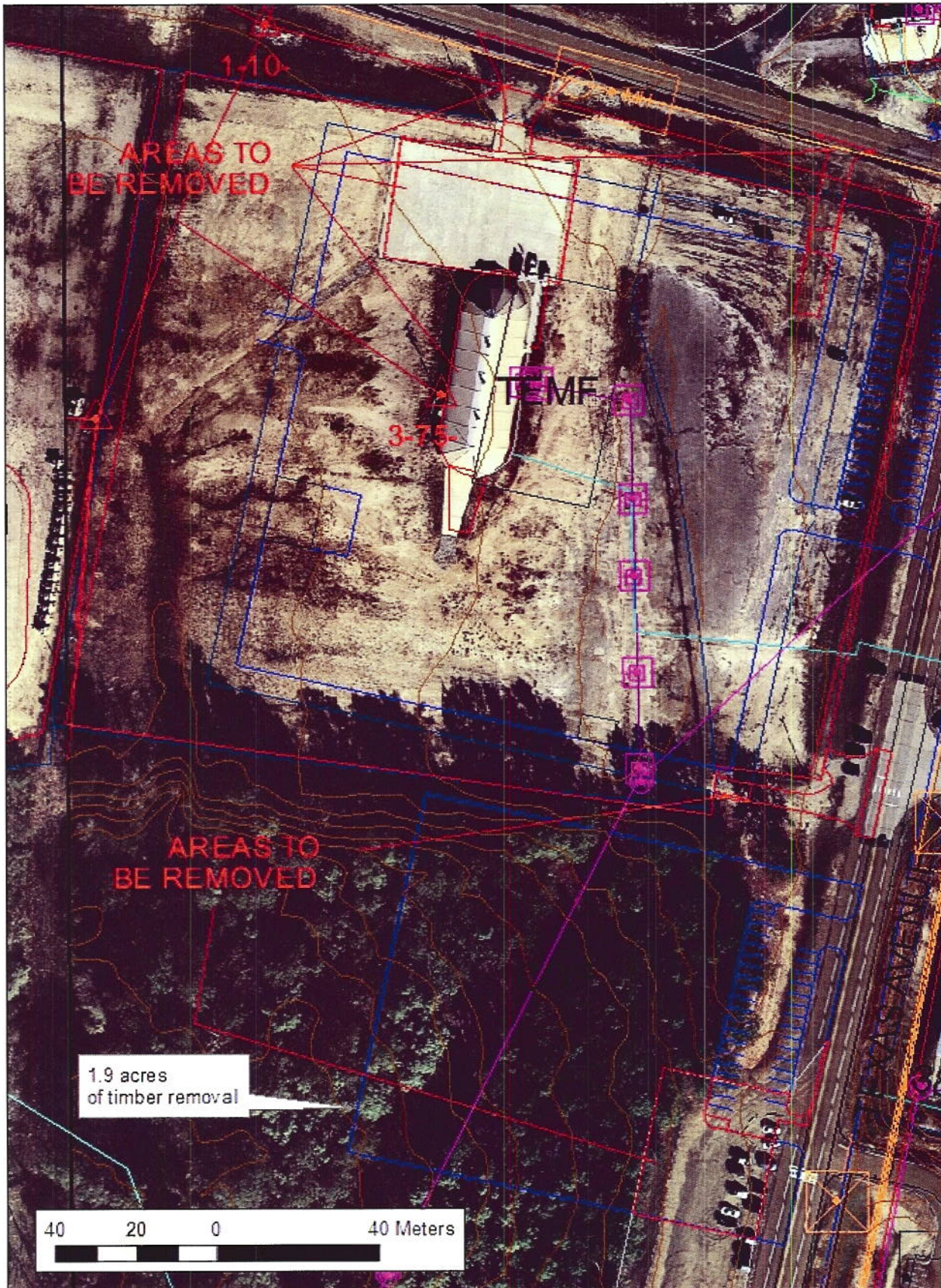
*Selected by Proposed SOW page 2 of Field Survey*

	Timber Removal	Spillway Possibility	Cost / or Dist Work	Removal Required	govt must Espritado / permit	Kids turned out
A111	1.9ac	yes	Worst	1 structure	NO	NO
A112	1.3ac	NO	midch	8 structures	yes	NO
A113 <i>environmentally preferred</i>	.3ac	NO	Best	1 structure	NO	yes



# Option 1 - Preferred Alternative

CY10091 ENRMD Control Number



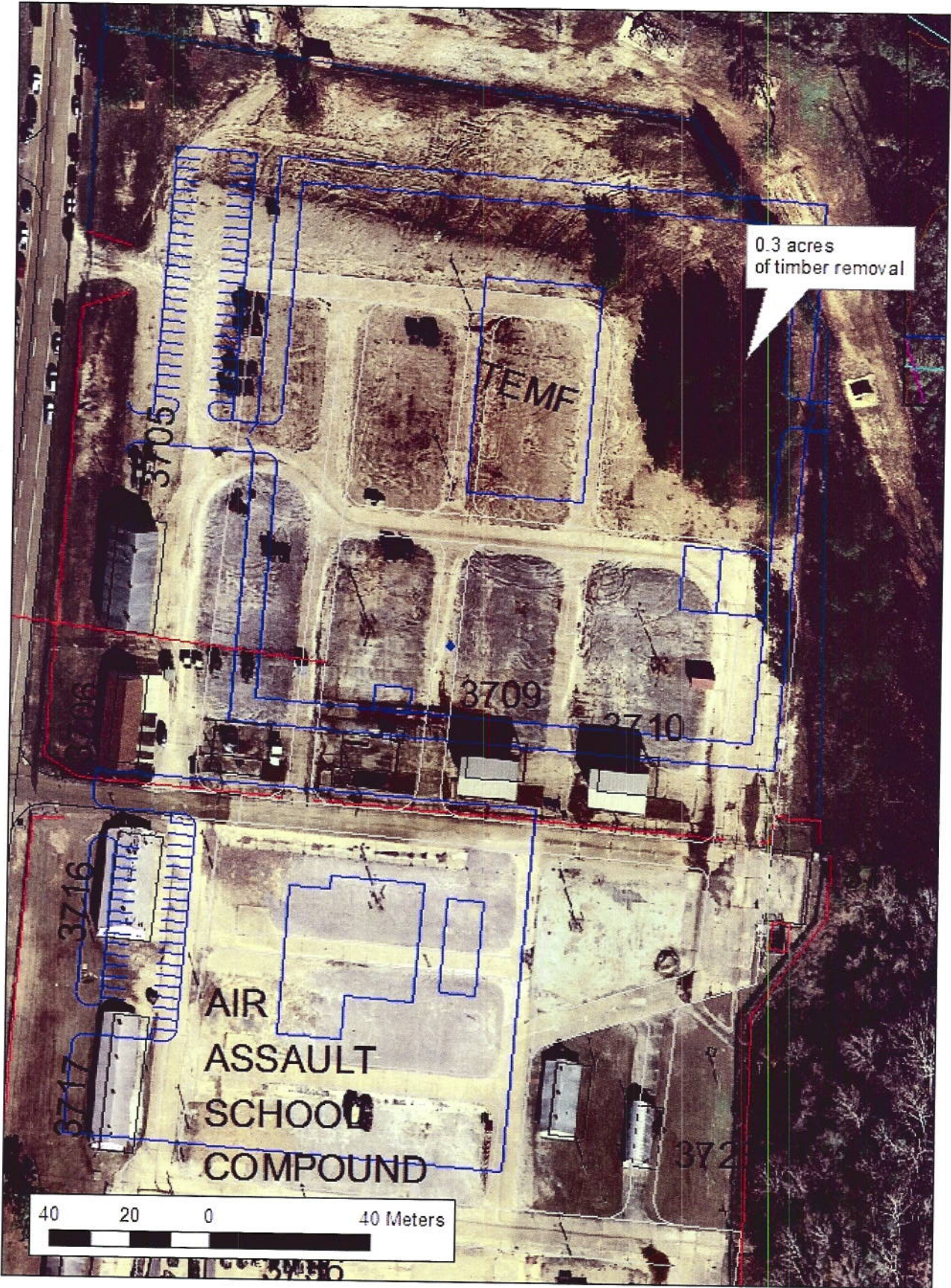


Option 2



CY10091 ENRMD Control Number





CY10091 ENRMD Control Number



**DEPARTMENT OF THE ARMY**  
**JOINT READINESS TRAINING CENTER AND FORT POLK**  
 FORT POLK LOUISIANA 71459  
**ENVIRONMENTAL ANALYSIS/FIELD SURVEY REPORT**  
 of  
**Construction of TEMF and COF facilities to support Unit Ops, Fort Polk, LA (PN 69199).**  
**CY10091**

CY10091 ENRMD Control Number

On 01 March 2010 a field survey was conducted by a NEPA staff member. An inspection of the site location was conducted as a baseline survey to evaluate potential impacts of the proposed action. The proposed action is for the construction of tactical equipment maintenance facility and company operations facility to support Fort Polk Unit Operations. The proposed project is needed to provide required maintenance and operations space. Project construction will include site preparation (i.e. clearing, grading, drainage work, demolition, etc.) and installation of utilities (i.e. electrical, communication, etc.) for the structures. During site preparation and prior to construction, vegetation may need to be removed. Any vegetative debris will be properly removed from the construction site and/or possibly burned onsite, dependent on the type and/or amount of debris. In addition to the construction of the buildings, site preparation, and installation of utilities, this construction project will also include construction of various supporting facilities/structures (i.e. paving, fencing, parking lot, etc.). The contractor awarded the project will be required (and this requirement will be placed in the Scope of Work) to obtain appropriate permits and/or necessary approvals associated with and required for new construction projects, in accordance with State, Federal, and Fort Polk regulations (i.e. submit a Notice of Intent, completion of Storm Water Pollution Prevention Plan prior to any ground disturbance activities, submission of applicable documentation to the Louisiana Department of Environmental Quality, wetland/404 permits, etc.). If the limits of construction exceed the submitted project footprint all construction must stop and the new project footprint must be submitted to the Environmental and Natural Resources Management Division in order for further impacts to be analyzed. To accomplish the proposed action three alternative site locations were developed and maps are attached. The purpose of the proposed action is to provide needed maintenance and operations spaces on Fort Polk. I observed that no environmental impacts would occur during the construction of a tactical equipment maintenance facility and company operations facility, as stated above, additionally, the action meets the screening criteria for a Record of Environmental Consideration.

The proposed action is covered under categorical exclusion (CX) number C-1 32 Code of Federal Regulations (CFR) 651. CX C-1 states - "Construction of an addition to an existing structure of new construction on a previously undisturbed site if the area to be disturbed has no more than 5.0 cumulative acres of new surface disturbance. This does not include construction of facilities for the transportation, distribution, use, storage, treatment, and disposal of solid waste, medical waste, and hazardous waste (REC required)." In order for a categorical exclusion to be used as stated in 32 CFR 651, a set of screening criteria must be met. Those screening criteria are listed below.

A CX may be used only when each of the following screening criteria is true:

- The action has NOT been segmented. **TRUE**
- The action does NOT have a reasonable likelihood of causing significant effects on public health, safety or the environment. **TRUE**
- This action does NOT cause an imposition of uncertain or unique environmental risks. **TRUE**
- This action is NOT of greater scope or size than is normal for this category of action. **TRUE**
- This action is NOT expected to produce reportable releases of hazardous or toxic substances as specified in 40 CFR part 302, Designation, Reportable Quantities, and Notification. **TRUE**
- This action is NOT expected to produce releases of petroleum, oils, and lubricants (POL) except from a properly functioning engine or vehicle, application of pesticides and herbicides, where the proposed



action results in requirement to develop or amend a Spill Prevention, Control, or Counter Measure Plan.

TRUE

- There is NO reasonable likelihood of this action violating any federal, state, or local law or requirements imposed for the protection of the environment. TRUE
- This action does NOT involve effects on the environment that are highly uncertain, involve unique or unknown risks, or are scientifically controversial. TRUE
- This action does NOT establish a precedent for future actions that are reasonably likely to have a future significant effect. TRUE
- This action is not expected to potentially degrade an already existing poor environment or effect areas not already significantly modified from their natural condition. TRUE
- This action is NOT expected produce unresolved effects on (1) Proposed federally listed, threatened, or endangered species or the r designate critical habitats, (2) Properties listed or eligible for listing on the Natural Register of Historic Places, (3) Areas having special designation or recognition such as prime or unique agriculture lands; coastal zones; designated wilderness or wilderness study areas; wild and scenic rivers; National Historic Landmarks; 100-year flood plains; wetlands; sole source aquifers; National Wildlife Refuges; national Parks; areas of critical environmental concern; or other areas of high environmental sensitivity, or (4) Cultural Resources as defined in AR 200-4. TRUE

CY10091 ENRMD Control Number

### Conclusion of Findings

An inspection of the three proposed sites for the construction of a tactical equipment maintenance facility and company operations facility, Fort Polk, La was conducted as a baseline survey to evaluate the potential environmental impacts of the proposed project. Three alternative site locations were evaluated for environmental impacts as a result of the proposed action (see maps). The three site locations were: Alternative 1, located on the west side of the southern end of Texas Avenue; Alternative 2, located on Command Circle; Alternative 3, located within the Air Assault School Compound (see maps). The proposed project and alternative site locations were reviewed by the Environmental and Natural Resources Management Division (ENRMD). The branches of ENRMD reviewing the proposed project were: Compliance Management Branch (CMB), Conservation Branch (CB), and Natural Resources Management Branch (NRMB).

X *3.25-10*

Alternative 1 (located on the west side of the southern end of Texas Avenue)







CY10091 ENRMD Control Number

Alternative 1 was reviewed by the Compliance Management Branch (CMB) program managers and subject matter experts for significant environmental impacts on CMB programs. CMB subject matter experts commented on air quality, indoor air quality, storm water quality, drinking and waste water quality, lead and asbestos, solid/hazardous material waste, and the restoration program. No indoor air quality or air quality impacts are expected as a result of the proposed action. For additional guidance regarding indoor air quality and air quality regulations please refer to Enclosure #1 and #2 of this document. For additional guidance regarding storm water/water quality, including drinking and waste water, regulations please refer to Enclosure #3 and #4 of this document. The construction of new facilities requires asbestos free certification upon completion of the project. For additional guidance regarding lead and asbestos regulations please refer to Enclosure #9 of this document. No impacts on the solid/hazardous material waste program are expected as a result of the proposed project (see Enclosure #10). **Alternative 1 poses the possibility that past fueling operations may have impacted surface, subsurface, or groundwater media.** For additional guidance regarding the restoration program, refer to Enclosure #11.

Alternative 1 was reviewed by the Conservation Branch (CB) program managers and subject matter experts for significant environmental impacts on CB programs. CB subject matter experts commented on cultural resources, endangered species, sensitive plants or bogs, pest management, and erosion control programs. No National Register eligible, potentially eligible archaeological sites, or historic cemeteries are located near or within the project footprint of Alternative 1, therefore no significant environmental impacts are expected on the cultural resources program as a result of the proposed project (see Enclosure #5). No significant environmental impacts are anticipated for the endangered species program as a result of the proposed project (see Enclosure #7). After an inspection of Alternative 1 for environmental impacts on sensitive plants or bogs, it was determined that no significant impacts are anticipated as a result of the proposed project (see Enclosure #8). Upon review of the proposed project by pest management, no environmental impacts are expected as a result of the proposed project, although the Installation Design Guide must be followed during construction as it pertains to the treatment of the building for termites during construction (see Enclosure #13). Alternative 1 is located on a relatively flat and mostly previously disturbed site, therefore no potential erosion control concerns are related to the proposed project (see Enclosure #12).

Alternative 1 was also reviewed by the Natural Resources Management Branch for environmental concerns. On 24 March 2010, a subject matter expert from the Natural Resources Management Branch inspected the site of Alternative 1 for the proposed project for concerns regarding timber removal, in which it was determined that no environmental concerns would result from the proposed action at Alternative 1. The timber was found to be merchantable and will be harvested by the Natural Resources Management Branch prior to construction (see Enclosure #6). **Coordination with Mr. Bruce Martin, Chief of Natural Resources Management Branch or Mr. Chad Tilley, Natural Resources Management Branch, must be made before any timber removal from the project site is conducted. Mr. Martin's contact numbers are (337) 531-7912 (office) or (337) 208-2802 (cell) and Mr. Tilley's contact numbers are (337) 531-7912 (office) or (337) 208-2746 (cell).**



Alternative 2 (located on Command Circle)

Alternative 2 was reviewed by the Compliance Management Branch (CMB) program managers and subject matter experts for significant environmental impacts on CMB programs. CMB subject matter experts commented on air quality, indoor air quality, storm water quality, drinking and waste water quality, lead and asbestos, solid/hazardous material waste, and the restoration program. No indoor air quality or air quality impacts are expected as a result of the proposed action. For additional guidance regarding indoor air quality and air quality regulations please refer to Enclosure #1 and #2 of this document. For additional guidance regarding storm water/water quality, including drinking and waste water, regulations please refer to Enclosure #3 and #4 of this document. The construction of new facilities requires asbestos free certification upon completion of the project. For additional guidance regarding lead and asbestos regulations please refer to Enclosure #9 of this document. No impacts on the solid/hazardous material waste program are expected as a result of the proposed project (see Enclosure #10). Alternative 2 is not anticipated to impact any environmental areas of concern for the restoration program (see Enclosure #11).

Alternative 2 was reviewed by the Conservation Branch (CB) program managers and subject matter experts for significant environmental impacts on CB programs. CB subject matter experts commented on cultural resources, endangered species, sensitive plants or bogs, pest management, and erosion control programs. No National Register eligible, potentially eligible archaeological sites, or historic cemeteries are located near or within the project footprint of Alternative 2, therefore no significant environmental impacts are expected on the cultural resources program as a result of the proposed project (see Enclosure #5). No significant environmental impacts are anticipated for the endangered species program as a result of the proposed project (see Enclosure #7). After an inspection of Alternative 2 for environmental impacts on sensitive plants or bogs, it was determined that no significant impacts are anticipated as a result of the proposed project (see Enclosure #8). Upon review of the proposed project by pest management, no environmental impacts are expected as a result of the proposed project, although the Installation Design Guide must be followed during construction as it pertains to the treatment of the building for termites during construction (see Enclosure #13). Alternative 2 is located on a relatively flat and mostly previously disturbed site, therefore no potential erosion control concerns are related to the proposed project (see Enclosure #12).

Alternative 2 was also reviewed by the Natural Resources Management Branch for environmental concerns. On 24 March 2010, a subject matter expert from the Natural Resources Management Branch inspected the site of Alternative 2 for the proposed project for concerns regarding timber removal, in which it was determined that no environmental concerns would result from the proposed action at Alternative 2. The timber was found to be merchantable and will be harvested by the Natural Resources Management Branch prior to construction (see Enclosure #6). **Coordination with Mr. Bruce Martin, Chief of Natural Resources Management Branch or Mr. Chad Tilley, Natural Resources Management Branch, must be made before any timber removal from the project site is conducted. Mr. Martin's contact numbers are (337) 531-7912 (office) or (337) 208-2802 (cell) and Mr. Tilley's contact numbers are (337) 531-7912 (office) or (337) 208-2746 (cell).**



Alternative 3 (located within the Air Assault School Compound)

CY10091 ENRMD Control Number

Alternative 3 was reviewed by the Compliance Management Branch (CMB) program managers and subject matter experts for significant environmental impacts on CMB programs. CMB subject matter experts commented on air quality, indoor air quality, storm water quality, drinking and waste water quality, lead and asbestos, solid/hazardous material waste, and the restoration program. No indoor air quality or air quality impacts are expected as a result of the proposed action. For additional guidance regarding indoor air quality and air quality regulations please refer to Enclosure #1 and #2 of this document. For additional guidance regarding storm water/water quality, including drinking and waste water, regulations please refer to Enclosure #3 and #4 of this document. The construction of new facilities requires asbestos free certification upon completion of the project. For additional guidance regarding lead and asbestos regulations please refer to Enclosure #9 of this document. No impacts on the solid/hazardous material waste program are expected as a result of the proposed project (see Enclosure #10). Alternative 2 is not anticipated to impact any environmental areas of concern for the restoration program (see Enclosure #11).

Alternative 3 was reviewed by the Conservation Branch (CB) program managers and subject matter experts for significant environmental impacts on CB programs. CB subject matter experts commented on cultural resources, endangered species, sensitive plants or bogs, pest management, and erosion control programs. No National Register eligible, potentially eligible archaeological sites, or historic cemeteries are located near or within the project footprint of Alternative 3, therefore no significant environmental impacts are expected on the cultural resources program as a result of the proposed project (see Enclosure #5). No significant environmental impacts are anticipated for the endangered species program as a result of the proposed project (see Enclosure #7). After an inspection of Alternative 3 for environmental impacts on sensitive plants or bogs, it was determined that no significant impacts are anticipated as a result of the proposed project (see Enclosure #8). Upon review of the proposed project by pest management, no



environmental impacts are expected as a result of the proposed project, although the Installation Design Guide must be followed during construction as it pertains to the treatment of the building for termites during construction (see Enclosure #13). Alternative 3 is located on a relatively flat and mostly previously disturbed site, therefore no potential erosion control concerns are related to the proposed project (see Enclosure #12).

Alternative 3 was also reviewed by the Natural Resources Management Branch for environmental concerns. On 24 March 2010, a subject matter expert from the Natural Resources Management Branch inspected the site of Alternative 3 for the proposed project for concerns regarding timber removal, in which it was determined that no environmental concerns would result from the proposed action at Alternative 3. The timber was found to be merchantable and will be harvested by the Natural Resources Management Branch prior to construction (see Enclosure #6). Coordination with Mr. Bruce Martin, Chief of Natural Resources Management Branch or Mr. Chad Tilley, Natural Resources Management Branch, must be made before any timber removal from the project site is conducted. Mr. Martin's contact numbers are (337) 531-7912 (office) or (337) 208-2802 (cell) and Mr. Tilley's contact numbers are (337) 531-7912 (office) or (337) 208-2746 (cell).

A decision matrix for the proposed project was not completed during the review of this proposed project.

#### Summary of Findings

Upon review of comments submitted by subject matter experts and the proposed project, it has been determined that the environmentally preferred alternative for the proposed project is Alternative 3 (located within the Air Assault School Compound), the 2<sup>nd</sup> environmentally preferred alternative is Alternative 2 (located on Command Circle), and the least environmentally preferred alternative is Alternative 1 (located on the west side of the southern end of Texas Avenue).

\* Alternative 3 is the environmentally preferred alternative site since most of the footprint of Alternative 3 has been previously disturbed and will require the least amount of tree removal from within the project footprint.

\* Alternative 2 was selected as the 2<sup>nd</sup> environmentally preferred alternative since the location of Alternative 2 consist of previously disturbed areas (although less than that of Alternative 3) and will require the least amount of tree removal (equal amount of tree removal with Alternative 3) from within the project footprint.

\* Alternative 1 was selected as the least environmentally preferred alternative since the footprint of Alternative 1 would require the most amount of new disturbance and therefore the most amount of tree removal from within the project footprint. Alternative 1 also poses impacts to the restoration program since past fueling operations may have impacted the project site.

If there are no changes in this scope of work or with the alternative locations of the proposed action, no other environmental analysis is planned. In conclusion the nature of this action poses no significant environmental impacts to the environment. The proposed action meets the screening criteria for the completion of a Record of Environmental Consideration under categorical exclusion C-1 of the 32 CFR 651.

A. Sara Thames, 25 March 2018

A. Sara Thames, Ecologist  
DPW/ENRMD-Conservation Branch  
(337) 531-1653

CY10091 ENRMD Control Number

**From:** Veillon, Tammy G Ms CIV USA IMCOM  
**Sent:** Thursday, March 11, 2010 1:30 PM  
**To:** CEDARS, ALLISON Ms CIV USA IMCOM; Thames, Sara Ms CIV USA IMCOM  
**Subject:** RE: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)  
**Attachments:** TEMF\_Unit Ops Bldg Construction CY10091.doc

Classification: UNCLASSIFIED  
Caveats: FOUO

Attached is the IAQ response for this REC.

-----Original Message-----

**From:** CEDARS, ALLISON Ms CIV USA IMCOM  
**Sent:** Tuesday, February 23, 2010 11:11 AM  
**To:** Baker, Christina L CTR USA; Brewer, Kathleen B CTR USA; Broussard, Nathan G Mr CIV USA IMCOM; Fitzgerald, Timothy B CIV USA IMCOM; Guzman, Sheilla CIV USA IMCOM; Hartzell, Frederick J CIV USA; Jones, Aishah F CTR USA IMCOM; Madison, Raywood T CTR USA; Moltsau, Alan W CIV USA IMCOM; Moore, Joseph W Mr CIV USA IMCOM; Skinner, Harvey Mr CIV USA IMCOM; Veillon, Tammy G Ms CIV USA IMCOM  
**Cc:** Thames, Sara Ms CIV USA IMCOM  
**Subject:** CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: FOUO

All,

The following REC has been submitted for environmental review:

CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

Project Evaluator is Sara Thames, 531-1653.

Please submit all comments/responses to Sara Thames and Allison Cedars.

Thank you,  
Allison Cedars  
Ecologist  
NEPA Section  
DPW, ENRMD, Conservation Branch  
1697 23rd Street, Building 2543  
Office: (337) 531-6725  
Fax: (337) 531-2627

Classification: UNCLASSIFIED  
Caveats: FOUO

Classification: UNCLASSIFIED  
Caveats: FOUO

CY10091 ENRMD Control Number



The following is the review of proposed projects regarding concerns related to Indoor Air Quality. This review applies to the following proposal CY10091.

1. The project described in the statement of work has the potential to significantly impact indoor air quality. Since the IAQ of a non-existent facility cannot be assessed the following recommendations provide guidance on providing a facility with IAQ that will be suitable for higher risk occupants. If mold growth is encountered during the construction the following information is provided as guidance to prevent significant negative impacts to IAQ. Care should also be taken during new construction to utilize materials which inhibit mold growth.

2. Providing the appropriate amount of outside air also has the potential to positively impact the overall indoor air quality present in a facility. ASHRAE 62.1 (2007 version) provides guidance on the appropriate level of outside air required per person. It should be noted that this is the minimum recommended outside air (OA) and that significant improvements in indoor air quality are observed when the flow is increased to approximately 20 cfm/person OA.

3. Insulating wraps and other building materials utilized in this project should minimize the use of cellulose containing materials as these provide a potential food source for mold. This is especially critical in attic spaces where warm, moist air is already present.

4. Additional improvements in indoor air quality can also be accomplished through the following measures in HVAC design:

A. HVAC system which allows for filters to be placed in series, where outside and return air are first passed through an arrestance filter (MERV 7) and then passed through a filter with a higher efficiency rating (MERV 11).

B. Run return air through a metal ductwork system to minimize debris in the return air system to discourage mold growth.

C. System design should allow for dehumidification of outside air such that a facility may maintain relative humidity at 40-60%.

5. A properly operating HVAC system will allow for proper dehumidification of the climate controlled space. For best results for thermal comfort and inhibiting mold growth, 40 - 50% relative humidity is recommended. This is easily accomplished by installing a humidity monitoring device in-line with the HVAC system.

6. Building materials should be utilized which inhibit mold growth through the use chemical treatment or cellulose-free construction.

7. Care should be taken during construction to minimize the migration of dust into the HVAC ductwork. All intake and exhaust vents should be sealed while performing activities which may generate large amounts of particulates during construction.

8. The use of ceiling tile composed primarily of cellulose should be avoided. Cellulose readily absorbs moisture from the air serving as a



food and moisture source for mold. These ceiling tiles also require frequent replacement due to the absorption of moisture.

9. Solvents and sealants may contain high levels of volatile organic compounds (VOCs). Proper industrial hygiene practices should be used when handling any of these substances and should always be handled in a well-ventilated area.

10. Any debris collected from rooms suspected of containing excessive mold spores should be double bagged in 6 mil plastic bags and sealed with duct tape.

11. The supply air filters on the HVAC system may quickly become clogged due to increased particulates present in the facility due to renovation activities and should be changed frequently to avoid filter breakthrough.

12. Contractor should ensure that measures are taken during renovation to minimize the potential exposure of personnel to poor indoor air quality. This should include at a minimum PPE designed to inhibit exposure of personnel to microbial growth. Contractors should obtain recommendations from an industrial hygienist for a determination of the acceptable level of risk associated with the different levels of mold remediation.

CY10091 ENRMD Control Number

MEMORANDUM FOR ENRMD, Conservation Branch (Attn: NEPA Staff)

SUBJECT: Construction of TEMF and COF Facilities for PN 69199, Fort Polk, LA CY10091

CY10091 ENRMD Control Number

1 Review of the proposed scope of work to construct a Tactical Equipment Maintenance Facility (TEMF) and a company Operations Facility (COF) to support Fort Polk Unit Operations, Project Number 69199. This project is considered a "design build" and as such the exact size and type of any comfort heating and cooling have yet to be determined. Based on the expected size and operational characteristics it is not anticipated to significantly impact the JRTC and Fort Polk Clean Air Act (Title V) requirements. The act of preparing the site for construction is not expected to have a negative impact on the installations air quality. As information concerning any potential air emission sources is finalized a more detailed assessment of air quality impacts will be made. Please notify this office of any changes in the Scope of Work to ensure final product is in compliance with Title V and Title VI of the Clean Air Act.

2 New HVAC units should not contain Ozone Depleting Compounds, rather alternative refrigerants should be used.

3 All work associated with this project must be performed in accordance with 40 CFR 82, Protection of Stratospheric Ozone; Titles V and VI of the Clean Air Act; and Army Regulation (AR) 200- Specifically:

A. All work on equipment containing ODCs must be performed by certified technicians using certified equipment, IAW 40 CFR 82.154.

B. All persons disposing of appliances containing ODCs, must evacuate the refrigerant in the entire unit to a recovery or recycling machine certified pursuant to 40 CFR 82.158.

C. Per 40 CFR 82.154, no person maintaining, servicing, repairing, or disposing of appliances may knowingly vent or otherwise release into the environment any class I or class II substance used as refrigerant in such equipment. All releases of ODCs shall be reported to DPW, Environmental and Natural Resources Management Division, Compliance Management Branch as soon as possible.

4. Point of contact is the undersigned at (337) 531-6026, or Harvey.Skinner@us.army.mil.

Harvey Skinner  
Installation Air Quality Manager

**From:** Baker, Christina L CTR USA  
**Sent:** Tuesday, February 23, 2010 1:07 PM  
**To:** CEDARS, ALLISON Ms CIV USA IMCOM; Thames, Sara Ms CIV USA IMCOM  
**Subject:** RE: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)  
**Attachments:** Storm Water REC INFO FINAL.docx

Classification: UNCLASSIFIED  
Caveats: FOUO

Please see the attached storm water comments in reference to the narrative provided and the environmental parameters selected for CY10091.

Christina Baker, Contractor  
Innovar Environmental Inc.  
DPW-ENRMD  
1647 23rd Street Building 2516  
Fort Polk, LA 71459-5509  
[Christina.baker2@us.army.mil](mailto:Christina.baker2@us.army.mil)  
COMM: 337.531.2894  
DSN: 863.2894  
FAX: 337.531.8950

CY10091 ENRMD Control Number

-----Original Message-----

**From:** CEDARS, ALLISON Ms CIV USA IMCOM  
**Sent:** Tuesday, February 23, 2010 11:11 AM  
**To:** Baker, Christina L CTR USA; Brewer, Kathleen B CTR USA; Broussard, Nathan G Mr CIV USA IMCOM; Fitzgerald, Timothy B CIV USA IMCOM; Guzman, Sheilla CIV USA IMCOM; Hartzell, Frederick J CIV USA; Jones, Aishah F CTR USA IMCOM; Madison, Raywood T CTR USA; Moltsau, Alan W CIV USA IMCOM; Moore, Joseph W Mr CIV USA IMCOM; Skinner, Harvey Mr CIV USA IMCOM; Veillon, Tammy G Ms CIV USA IMCOM  
**Cc:** Thames, Sara Ms CIV USA IMCOM  
**Subject:** CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: FOUO

All,

The following REC has been submitted for environmental review:

CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

Project Evaluator is Sara Thames, 531-1653.

Please submit all comments/responses to Sara Thames and Allison Cedars.

Thank you,  
Allison Cedars  
Ecologist  
NEPA Section  
DPW, ENRMD, Conservation Branch  
1697 23rd Street, Building 2543



POC: Christina Baker  
337-531-2894  
Christina.baker2@us.army.mil

**Best Management Practices (BMPs) for Construction Activity of Any Size:** Only storm water should enter the storm water conveyances and inlet systems; the installation has a separate storm sewer system that drains directly to receiving streams. **Dumping into the storm sewers or natural water bodies is prohibited.**

- Employ soil erosion measures such as silt fences and inlet protection to prevent sediment from leaving the site and entering the storm drains
- Vegetate or re-vegetate areas of ground that have been disturbed as soon as possible to prevent soil erosion and subsequent storm water conveyance/receiving stream sedimentation
- On-site preventative measures should be taken to ensure that potential pollutants are not released into the environment
- During construction and upon completion, the site should be free of excess construction debris and associated litter to prevent contamination of storm water

**Small Construction (1 Acre to 4.99999 Acres) Storm Water General Permit (#LAR200000):**

- No permit fees will be assessed by the Louisiana Department of Environmental Quality (LDEQ) for coverage under this permit
  - Discharge storm water from construction activities will be automatically covered for those that meet the applicability requirements defined in the permit
  - Written notification of intent (NOI) under this general permit is not required
  - Site/contact information and a Storm Water Pollution Prevention Plan (SWPPP) will be developed, implemented, and kept on site
  - A Project Completion Report will be submitted to LDEQ upon completion and stabilization of the construction site in accordance with the permit guidelines
- For further information and guidance, please contact LDEQ customer service at 225-219-5337 or go to the link below.

[www.deq.louisiana.gov/portal/Portals/0/permits/lpdes/LAR200000.pdf](http://www.deq.louisiana.gov/portal/Portals/0/permits/lpdes/LAR200000.pdf)

**Storm Water General Permit for Construction Activities of 5 Acres or More (#LAR100000):**

- Permit fees will be assessed by LDEQ for coverage under this permit
  - An NOI must be submitted to LDEQ before permittees are authorized to discharge storm water
  - Site/contact information and a Storm Water Pollution Prevention Plan (SWPPP) will be developed, implemented, and kept on site
  - All permittees must submit a Notice of Termination (NOT) within thirty days upon completion and stabilization of the construction site in accordance with the permit guidelines
- For further information and guidance, please contact LDEQ customer service at 225-219-5337 or go to the link below.

[www.deq.louisiana.gov/portal/Portals/0/permits/lpdes/LAR100000.pdf](http://www.deq.louisiana.gov/portal/Portals/0/permits/lpdes/LAR100000.pdf)

CY10091 ENRMD Control Number

**Thames, Sara Ms CIV USA IMCOM**

**From:** Thames, Sara Ms CIV USA IMCOM  
**Sent:** Friday, February 26, 2010 4:33 PM  
**To:** Thames, Sara Ms CIV USA IMCOM  
**Subject:** FW: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)  
**Attachments:** modified new constrution statement.docx

Classification: UNCLASSIFIED  
Caveats: NONE

A. Sara Thames  
Ecologist, DPW/ENRMD/Conservation Branch  
1647 23rd Street, Building 2543  
Fort Polk, Louisiana 71459  
e-mail: [sara.thames@us.army.mil](mailto:sara.thames@us.army.mil)  
office: (337) 531-1653  
DSN: 863-1653  
fax: (337) 531-2627

CY10091 ENRMD Control Number

-----Original Message-----

**From:** Jones, Aishah F CTR USA IMCOM  
**Sent:** Thursday, February 25, 2010 4:50 PM  
**To:** CEDARS, ALLISON Ms CIV USA IMCOM; Thames, Sara Ms CIV USA IMCOM  
**Subject:** RE: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: NONE

Please find the attached memo in regarding the proposed action. Let me know if you have any questions.

AJ

-----Original Message-----

**From:** CEDARS, ALLISON Ms CIV USA IMCOM  
**Sent:** Tuesday, February 23, 2010 11:11 AM  
**To:** Baker, Christina L CTR USA; Brewer, Kathleen B CTR USA; Broussard, Nathan G Mr CIV USA IMCOM; Fitzgerald, Timothy B CIV USA IMCOM; Guzman, Sheilla CIV USA IMCOM; Hartzell, Frederick J CIV USA; Jones, Aishah F CTR USA IMCOM; Madison, Raywood T CTR USA; Moltsau, Alan W CIV USA IMCOM; Moore, Joseph W Mr CIV USA IMCOM; Skinner, Harvey Mr CIV USA IMCOM; Veillon, Tammy G Ms CIV USA IMCOM  
**Cc:** Thames, Sara Ms CIV USA IMCOM  
**Subject:** CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: FOUO

All,

The following REC has been submitted for environmental review:

CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

IMWE-POL-PWE 25 February 2010

MEMORANDUM FOR ENRMD, Conservation Branch (ATTN: NEPA Staff)

SUBJECT: REC CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

CY10091 ENRMD Control Number

1. The Louisiana Department of Health and Hospitals(LDHH) requires changes to the sanitary sewer system and drinking water systems be approved **prior to start of construction.**
2. Coordination with American Water is required prior to submitting plans and specifications to the LDHH to ensure the hydraulic capacity is not adversely impacted by increased loading and demand on the drinking water and waste water systems. Please contact Al Weinnig at (337) 531- 1178 for additional specifications.
3. Water meters will are required on new construction and significant renovations IAW with Army water conservation requirements.
4. Pumps, pipes, and new parts of the drinking water must be thoroughly disinfected by the use of chlorine before placing in use or furnishing water to consumers, water from new parts of the distribution system must be sanitized and found to be free of coliform bacteria IAW with state regulations.
5. Point of contact is undersigned (337) 531-7547 or [aishah.f.jones@us.army.mil](mailto:aishah.f.jones@us.army.mil).

Aishah F. Jones  
Drinking Water/ Water Quality Program Manager

Friday, April 29, 2011



IMSE-POL-PWE

19 Mar 2010

## MEMORANDUM OF RECORD

SUBJECT: Construction of TEMF and COF Facilities For PN 69199 (CY10091)

CY10091 ENRMD Control Number

**Alternative 1:**

No eligible or potentially eligible sites or structures are located near the proposed alternative and none will be impacted by the proposed project.

**Alternative 2:**

No eligible or potentially eligible sites or structures are located near the proposed alternative and none will be impacted by the proposed project.

**Alternative 3:**

No eligible or potentially eligible sites or structures are located near the proposed alternative and none will be impacted by the proposed project.

BRADLEY LAFFITTE  
STAFF ARCHAEOLOGIST  
DPW/ENRMD/CB

**From:** Martin, Bruce Mr CIV USA IMCOM  
**Sent:** Thursday, March 25, 2010 9:22 AM  
**To:** Thames, Sara Ms CIV USA IMCOM  
**Subject:** RE: CY10091 (UNCLASSIFIED)  
**Signed By:** bruce.d.martin@us.army.mil

Classification: UNCLASSIFIED  
Caveats: FOUO

Thanks for you and Chad reviewing the site..I concur with Chad's memo and recommend the merchantable timber harvest by our timber salvage contractor.

Bruce D. Martin  
Chief, Natural Resources  
Management Branch  
[bruce.d.martin@conus.army.mil](mailto:bruce.d.martin@conus.army.mil)  
COM 337.531.7912  
DSN 863.7912  
cell 337.208.2802  
fax 337.531.2122

-----Original Message-----

**From:** Thames, Sara Ms CIV USA IMCOM  
**Sent:** Thursday, March 25, 2010 9:07 AM  
**To:** Martin, Bruce Mr CIV USA IMCOM; Tilley, Chad T CIV USA IMCOM  
**Subject:** CY10091 (UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: FOUO

Attached is the memo that will attached to the REC-CY10091 regarding the timber. Please review. Thanks!

Sara

A. Sara Thames  
Ecologist, DPW/ENRMD/Conservation Branch  
1647 23rd Street, Building 2543  
Fort Polk, Louisiana 71459  
e-mail: [sara.thames@us.army.mil](mailto:sara.thames@us.army.mil)  
office: (337) 531-1653  
DSN: 863-1653  
fax: (337) 531-2627

Classification: UNCLASSIFIED  
Caveats: FOUO

Classification: UNCLASSIFIED  
Caveats: FOUO

CY10091 ENRMD Control Number



**CY10091-Construction of TEMF and COF Facilities (PN 69199).****March 24, 2010**

The proposed project (CY10091) was reviewed by the Natural Resources Management Branch for environmental concerns. On 24 Mar 2010, a subject matter expert from the Natural Resources Management Branch inspected the proposed project footprint sites for concern regarding timber removal, in which it was determined that no environmental concerns would result from the proposed action at any of the three proposed alternative sites. The timber at each of the three proposed alternative sites was determined to be merchantable.

Coordination with Mr. Bruce Martin, Chief of Natural Resources Management Branch, must be made before any timber removal from the project is conducted. Mr. Martin's contact numbers are (337) 531-7912 (office) or (337) 208-2802 (cell).

Please contact me if additional information is needed.

**Mr. Chad Tilley**

**Forestry Technician**

**Natural Resources Management Division**

**531-7912 (office); 208-2746 (cell)**

CY10091 ENRMD Control Number

Friday, April 29, 2011

**From:** Moore, Kenneth Mr CIV USA IMCOM  
**Sent:** Wednesday, March 24, 2010 12:23 PM  
**To:** Thames, Sara Ms CIV USA IMCOM  
**Subject:** RE: REC-CY10091 (UNCLASSIFIED)  
**Attachments:** CY10091 (RCW).docx

Classification: UNCLASSIFIED  
Caveats: FOUO

Sara,

Attached is the memo for CY10091. Thanks!

KM

Kenneth R. Moore  
Endangered Species Ecologist  
DA Civilian  
DPW ENRMD Conservation Branch  
337-531-7078 Fax 337-531-2396  
[kenneth.moore4@conus.army.mil](mailto:kenneth.moore4@conus.army.mil)

-----Original Message-----

**From:** Thames, Sara Ms CIV USA IMCOM  
**Sent:** Wednesday, March 17, 2010 12:49 PM  
**To:** Reynolds, Lloyd G CTR US USA IMCOM; Moore, Kenneth Mr CIV USA IMCOM  
**Subject:** REC-CY10091 (UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: FOUO

Ken/Lloyd,

Attached is a REC for the new construction of a TEMF and COF Facility. Can you please check the three alternative sites to see if any of the habitat is HMU and please provide appropriate comments, etc. Also, Lloyd do you see any issues with erosion, etc..., please comment also. If you have any questions, please let me know. Thanks!

Sara

A. Sara Thames  
Ecologist, DPW/ENRMD/Conservation Branch  
1647 23rd Street, Building 2543  
Fort Polk, Louisiana 71459  
e-mail: [sara.thames@us.army.mil](mailto:sara.thames@us.army.mil)  
office: (337) 531-1653  
DSN: 863-1653  
fax: (337) 531-2627

Classification: UNCLASSIFIED

**CY10091-Construction of TEMF and COF Facilities, Fort Polk, LA (PN 69199).****March 24, 2010**

The proposed project (CY10091) was reviewed by the Conservation Branch, Endangered Species for environmental concerns. The proposed project footprint sites are located within the cantonment area and are not considered HMU (Habitat Management Unit) for the RCW or potential LA Pine Snake habitat, therefore no environmental impacts on Endangered Species are expected as a result of the project at any of the proposed sites.

Please contact me if additional information is needed.

Mr. Ken Moore  
Ecologist, Conservation Branch  
531-7078 (office)

CY10091 ENRMD Control Number

Friday, April 29, 2011

Thames, Sara Ms CIV USA IMCOM

**From:** Allen, Charles M Dr CTR US USA IMCOM  
**Sent:** Wednesday, March 24, 2010 1:55 PM  
**To:** Thames, Sara Ms CIV USA IMCOM  
**Subject:** memo for REC-CY10091 (UNCLASSIFIED)  
**Attachments:** botany memo CY10091.docx  
**Signed By:** charles.m.allen1@us.army.mil

Classification: UNCLASSIFIED  
Caveats: FOUO

Attached is a memo regarding the botanical evaluation of the sites.

Dr. Charles Allen  
Botanist

Classification: UNCLASSIFIED  
Caveats: FOUO

CY10091 ENRMD Control Number

**CY10091-Construction of TEMF and COF Facilities (PN 69199).**

**March 24, 2010**

The proposed project (CY10091) was reviewed by the Conservation Branch, Botanical Section, for environmental impacts. The three sites for the project were reviewed in the database and map for rare plants for Fort Polk and no rare plant species have been located in or adjacent to any of the three sites and no rare plants would be expected within any of the three sites. Based on on-site observation and rare plant information, either of the three sites would not have any impact on any rare plant species.

Please contact me if additional information is needed.

Dr. Charles M. Allen  
Botanist, Senior Research Associate  
531-7535/charles.m.allen1@us.army.mil

CY10091 ENRMD Control Number

Friday, April 29, 2011

IMSE-POL-PWE

24 Feb. 2010

## MEMORANDUM FOR ENRMD, Conservation Branch (Attn: NEPA Staff)

Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations CY10091

1. Reviewed the proposed scope, Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations.
2. Construction of new facilities requires an Asbestos Free Certification at the completion of the project. Paint containing > .06% is prohibited.
3. Point of contact is the undersigned at (337) 531-9128, or Sheilla.guzman@us.army.mil

Sheilla Guzman

CY10091 ENRMD Control Number



**Thames, Sara Ms CIV USA IMCOM**

**From:** Fitzgerald, Timothy B CIV USA IMCOM  
**Sent:** Tuesday, March 16, 2010 9:36 AM  
**To:** Blume, Timothy CTR USA; CEDARS, ALLISON Ms CIV USA IMCOM; Lehnhoff, Lisa M Ms CIV USA; Thames, Sara Ms CIV USA IMCOM

REC 10091 requires no comment from solid waste

Tim Fitzgerald  
Installation Solid Waste Manager  
Environmental and Natural Resources Management Division  
1647 23rd Street Bldg 2516  
Fort Polk, La 71403  
Comm: (337) 531.6029  
FAX: 531.8950  
E-Mail: [timothy.fitzgerald1@us.army.mil](mailto:timothy.fitzgerald1@us.army.mil)

CY10091 ENRMD Control Number

**From:** Moore, Joseph W Mr CIV USA IMCOM  
**Sent:** Monday, March 15, 2010 2:49 PM  
**To:** CEDARS, ALLISON Ms CIV USA IMCOM; Thames, Sara Ms CIV USA IMCOM  
**Subject:** CY10091, TEMF/COF; PN 69199 - IRP concerns (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: FOUO

After review of site map, the installation restoration program has approved the REC. My concerns are documented below.

I have reviewed the REC for CY10091, TEMF/COF to support Unit Operations (PN 69199).

The locations of Option 2 and Option 3 do not have a potential impact to any environmental Areas of Concern under the Installation Restoration program (IRP) at Fort Polk.

Phil and I spoke with Mr. Durrett today and he is aware of ENRMD concerns about the location.

At the preferred location, Option 1, there is a possibility that past fueling operations may have impacted surface, subsurface, or groundwater media.

An underground fuel network was located in the 3500-3600 Block area. The network is shown on as-built drawings (Plan number M-1043) as Motor Fuel Unit #6. The environmental concern is that fuel may have leaked or been spilled from the AST area, the network of piping, and/or the fuel dispensing areas.

A railroad spur extended from the curve on Texas Avenue to just north of the present Used Oil Facility (corner of Illinois and Texas). The spur has since been removed. From the spur, railcars off-loaded fuel through a pump house into a group of 3 aboveground storage tanks (AST). Each AST held 12,000 gallons. The fuels were leaded gasoline, naphtha and possibly diesel fuel. From the AST farm, fuel was pumped via underground lines to 2 remote fuel dispensing areas. The pump house and ASTs were located less than 100 feet northwest of the present-day used oil recycling area.

The first concern is that, if soil and groundwater contamination occurred in the UST/pump house, it may have migrated in a southeasterly direction and may now underlie the northeast corner of the proposed TEMF/COF site.

The second concern is at the former fuel dispensing area, located just east of Bldg 3601. Six fuel dispensers were located to the west of the existing wash rack. On the 1940's map, they are shown as area MM. If contamination is present, it may have migrated, again to the southeast. This would impact the southwest corner of the proposed site.

Included on the M-1043 map are a total of seven similar Motor Fuel Units. Petroleum contamination from the units was confirmed as the source of contamination at Solid Waste Management Unit 26 (2900 Block) and at the Bldg 3401 restoration site.

During excavations at the 3200 Block several years ago, underground fuel lines were discovered several years ago. The underground fuel line was found to contain leaded gasoline, which indicates that the old Motor Fuel Unit networks were abandoned sometime in the past without removing the fuel. Because a preliminary assessment has not been performed at the site, there is no data with which to confirm or disprove the presence of environmental impacts. Nor is there enough justification for AEC to approve the creation of a new restoration site in the AEDB-R database at this time.

CY10091 ENRMD Control Number



Section: APPENDIX E  
 On of the project, workers must be on the alert for the possibility that fuel components could be unearthed. This may cause the work to be delayed pending further investigation.

Thank You:

Joe Moore

Installation Restoration Program Manager  
 DPW- ENRMD  
 1647 23rd Street - Bldg 2516  
 Fort Polk, LA 71459 - 5509  
 Ph 337-531-6305 (DSN 863)  
[Joe.w.moore1@us.army.mil](mailto:Joe.w.moore1@us.army.mil)

-----Original Message-----

From: CEDARS, ALLISON Ms CIV USA IMCOM  
 Sent: Tuesday, February 23, 2010 11:11 AM  
 To: Baker, Christina L CTR USA; Brewer, Kathleen B CTR USA; Broussard, Nathan G Mr CIV USA IMCOM; Fitzgerald, Timothy B CIV USA IMCOM; Guzman, Sheilla CIV USA IMCOM; Hartzell, Frederick J CIV USA; Jones, Aishah F CTR USA IMCOM; Madison, Raywood T CTR USA; Moltsau, Alan W CIV USA IMCOM; Moore, Joseph W Mr CIV USA IMCOM; Skinner, Harvey Mr CIV USA IMCOM; Veillon, Tammy G Ms CIV USA IMCOM  
 Cc: Thames, Sara Ms CIV USA IMCOM  
 Subject: \*\* SMWU \*\* CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED  
 Caveats: FOUO

All,

The following REC has been submitted for environmental review:

CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

Project Evaluator is Sara Thames, 531-1653.

Please submit all comments/responses to Sara Thames and Allison Cedars.

Thank you,  
 Allison Cedars  
 Ecologist  
 NEPA Section  
 DPW, ENRMD, Conservation Branch  
 1697 23rd Street, Building 2543  
 Office: (337) 531-6725  
 Fax: (337) 531-2627

Classification: UNCLASSIFIED  
 Caveats: FOUO

Classification: UNCLASSIFIED  
 Caveats: FOUO

CY10091 ENRMD Control Number

**From:** Reynolds, Lloyd G CTR US USA IMCOM  
**Sent:** Thursday, March 18, 2010 3:29 PM  
**To:** Thames, Sara Ms CIV USA IMCOM  
**Subject:** RE: REC-CY10091 (UNCLASSIFIED)  
**Attachments:** Alternative 1.jpg; Alternative 2.jpg; Alternative 3.jpg

Classification: UNCLASSIFIED  
Caveats: FOUO

Sara-

Here are the project locations with aerial photos. Since all of the sites are relatively flat and mostly previously disturbed, there are no potential erosion concerns.

Lloyd Reynolds, Contractor  
Freese & Nichols, Inc.  
DPW-ENRMD  
1697 23rd Street Building 2543  
Fort Polk, LA 71459  
[lloyd.reynolds@us.army.mil](mailto:lloyd.reynolds@us.army.mil)  
COMM: 337.531.1561  
DSN: 863.1561  
MOBILE: 337.513.1255  
FAX: 337.531.2627

-----Original Message-----

**From:** Thames, Sara Ms CIV USA IMCOM  
**Sent:** Wednesday, March 17, 2010 12:49 PM  
**To:** Reynolds, Lloyd G CTR US USA IMCOM; Moore, Kenneth Mr CIV USA IMCOM  
**Subject:** REC-CY10091 (UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: FOUO

Ken/Lloyd,

Attached is a REC for the new construction of a TEMF and COF Facility. Can you please check the three alternative sites to see if any of the habitat is HMU and please provide appropriate comments, etc. Also, Lloyd do you see any issues with erosion, etc..., please comment also. If you have any questions, please let me know. Thanks!

Sara

A. Sara Thames  
Ecologist, DPW/ENRMD/Conservation Branch  
1647 23rd Street, Building 2543  
Fort Polk, Louisiana 71459  
e-mail: [sara.thames@us.army.mil](mailto:sara.thames@us.army.mil)  
office: (337) 531-1653  
DSN: 863-1653  
fax: (337) 531-2627

CY10091 ENRMD Control Number

**CY10091-Construction of TEMF and COF Facilities (PN 69199).**

**March 18, 2010**

The proposed project (CY10091) was reviewed by the Pest Management Program for environmental concerns. After review of the REC, it was determined that no environmental concerns would result from the proposed action at any of the three alternative sites as long as the contractor and COR follow the information in the Installation Design Guide as it pertains to the treatment for termites (i.e. the structure, including all footing and slabs, must be pre-treated for termites, etc.).

Please contact the following if additional information is needed.

**Mr. Darrell Huckaby**  
Environmental Protection Specialist  
Conservation Branch  
531-1645 (office); 208-2706 (cell)

**Mr. Mike Nicholson**  
Environmental Protection Specialist  
Conservation Branch  
531-6373 (office); 208-2745 (cell)

CY10091 ENRMD Control Number

Amendment No. 003

## APPENDIX F

### Proposed Tactical Equipment Maintenance Facility Elevations And Proposed Company Operations Facility Conceptual Elevations

## Drawing Index

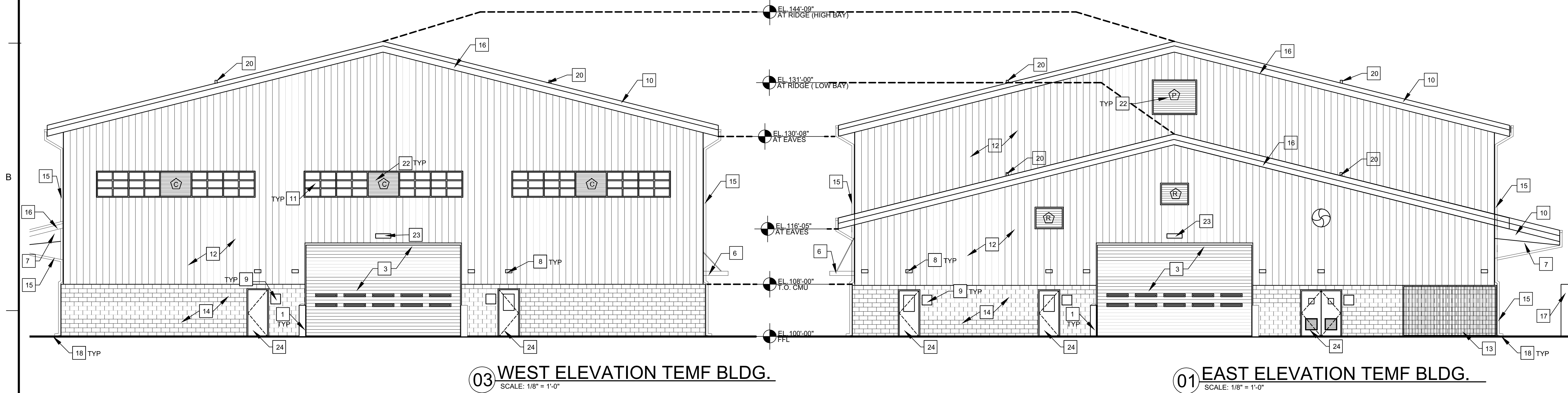
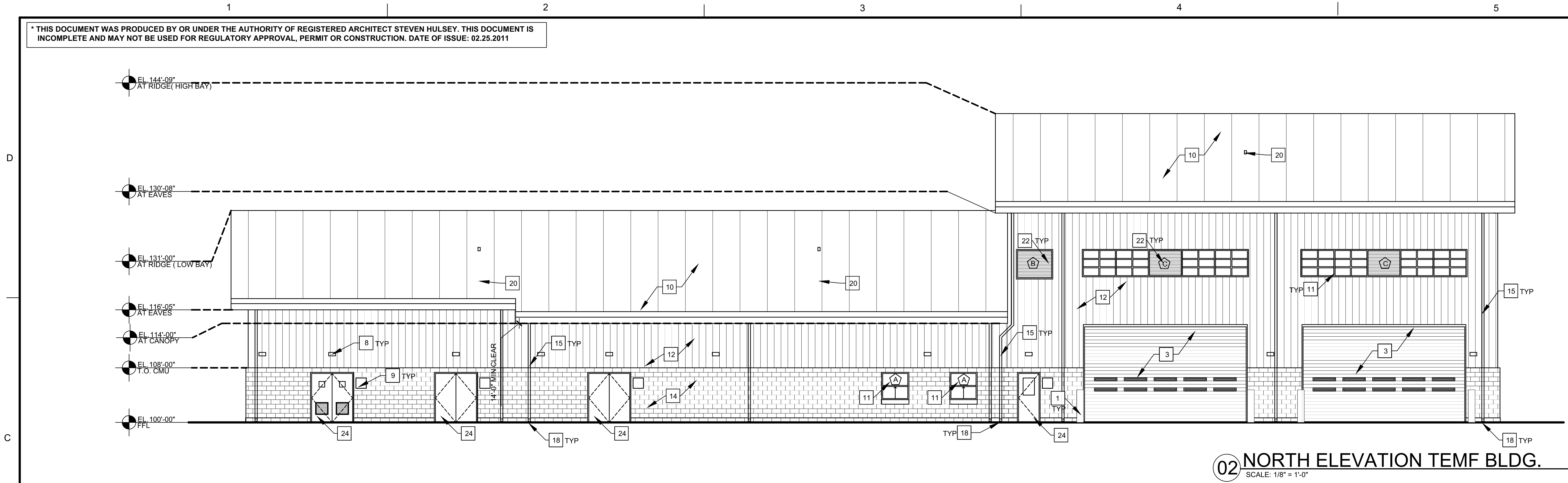
A-201 TEMF Proposed Elevation (From TEMF Contractor)

A-202 TEMF Proposed Elevation (From TEMF Contractor)

g:\CAD\10207\0000\Sheets\ELEVATIONS\TEMP.dwg

DEVASHREE22\HMD\02011

\* THIS DOCUMENT WAS PRODUCED BY OR UNDER THE AUTHORITY OF REGISTERED ARCHITECT STEVEN HULSEY. THIS DOCUMENT IS INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMIT OR CONSTRUCTION. DATE OF ISSUE: 02.25.2011



### GENERAL ELEVATION NOTES

1. SEE SHEET A-602 FOR EXTERIOR COLOR LEGEND.

### KEYED ELEVATION NOTES

- |   |   |
|---|---|
| 1 | 12" DIA. CONCRETE FILLED STEEL BOLLARDS, PAINT SAFETY YELLOW, TYP.              |
| 2 | NOT USED  |
| 3 | 24'-0" X 14'-0" COILING OVERHEAD STEEL DOOR, COLOR TO MATCH ROOF PANELS ( RP-1) |
| 4 | RECESSED KNOX BOX (4"x4"). EQUAL TO SERIES 3200 BY KNOX CO., PHOENIX, AZ.       |
| 5 | NOT USED  |

- |    |   |
|----|---|
| 6  | ENTRY CANOPY, SEE ELEVATION & DETAILS ON SHEET A-304.           |
| 7  | CANOPY BEAM, PAINTED TO MATCH METAL ROOF PANELS. ( RP-1)        |
| 8  | LIGHT FIXTURE, REF. ELECTRICAL                                  |
| 9  | ROOM IDENTIFICATION SIGNAGE, REF. A603,A105,A106                |
| 10 | PRE-FINISHED STRUCTURAL STANDING SEAM METAL ROOF PANELS (RP-1). |

- |    |   |
|----|---|
| 11 | BLAST MITIGATION ALUMINUM WINDOW, SEE WINDOW TYPE ELEVATIONS & DETAILS ON A-601 & A-703                     |
| 12 | PRE-FINISHED METAL WALL PANELS (WP-1).  |
| 13 | METAL CAGE TO STORE THE OAU   |
| 14 | SPLIT FACE CMU VENEER,(CMU-1)   |
| 15 | PRE-FINISHED CONT. GUTTER & DOWNSPOUT BY METAL BUILDING SYSTEM SUPPLIER, COLOR TO MATCH WALL PANELS (WP-1). |

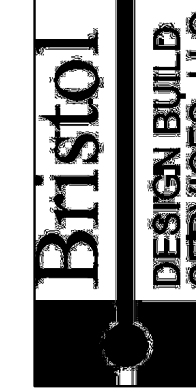
- |    |  |
|----|--|
| 16 | RAKE TRIM BY METAL BLDG SYSTEMS SUPPLIER, COLOR TO MATCH WALL PANELS (WP-1). |
| 17 | TOOL STORAGE CONTAINERS, SEE FLOOR PLANS FOR TYPE AND LOCATION               |
| 18 | SPLASHBLOCK ON GRADE.  |
| 19 | 10'-0" X 10'-0" SECTIONAL STEEL DOOR, COLOR TO MATCH ROOF PANELS (RP-1).     |
| 20 | FALL ARRESTOR, SEE ROOF PLAN   |

- |    |  |
|----|--|
| 21 | CRICKET  |
| 22 | LOUVER COLOR TO MATCH MTL. ROOF PANELS ( RP-1) SEE SHEET A-601 & A-703 |
| 23 | BUILDING IDENTIFICATION SIGNAGE REF. A603,A105,A106                    |
| 24 | PERSONNEL DOOR, PAINT TO MATCH MTL ROOF PANELS ( RP-1) REF. A- 601     |



US ARMY CORPS  
OF ENGINEERS

REVISIONS	DATE	DESCRIPTION	APP'D
1	03.28.11	95% CONSTRUCTION DOCUMENTS	



DESIGNED BY: DAVID SAFIR	DATE: 03.28.11	DRAWING CODE SCALE:	CHECKED BY: DAVID SAFIR	DATE: 03.28.11
DRAWN BY:	PROJECT A/E: STEVEN HULSEY		CORPORATE ASSOCIATES, INC.	

FORT POLK, LOUISIANA  
TACTICAL EQUIPMENT MAINTENANCE FACILITY

SHEET TITLE :  
ELEVATIONS TEMF

CAL PROJECT : 10207.0000

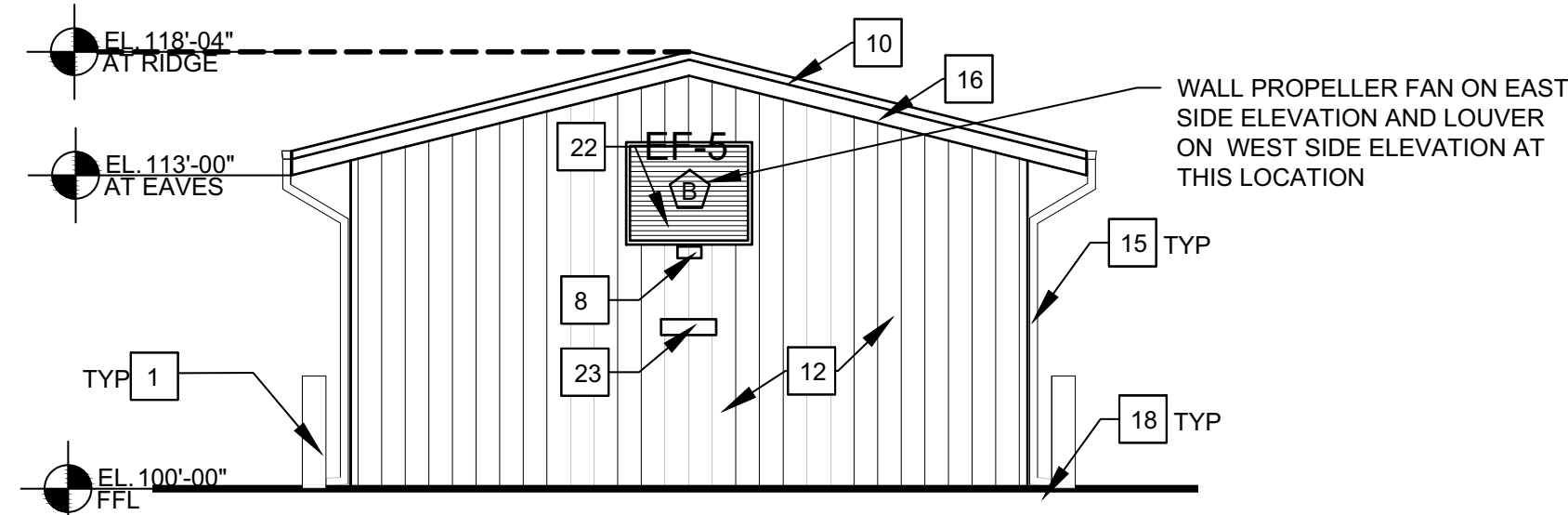
SHEET  
IDENTIFICATION  
A-201  
SHEET : XXOFXX



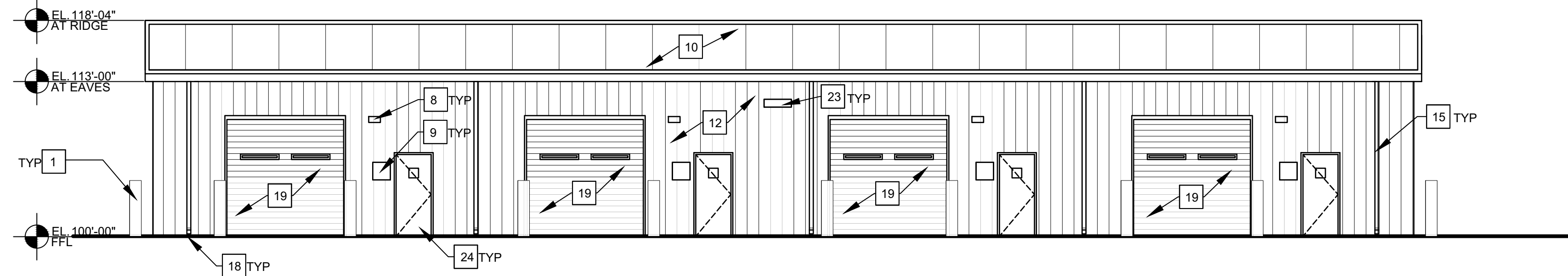
g:\CAD\10207\0000\Sheets\ELEVATIONS.dwg

DEVASHREE221104042011

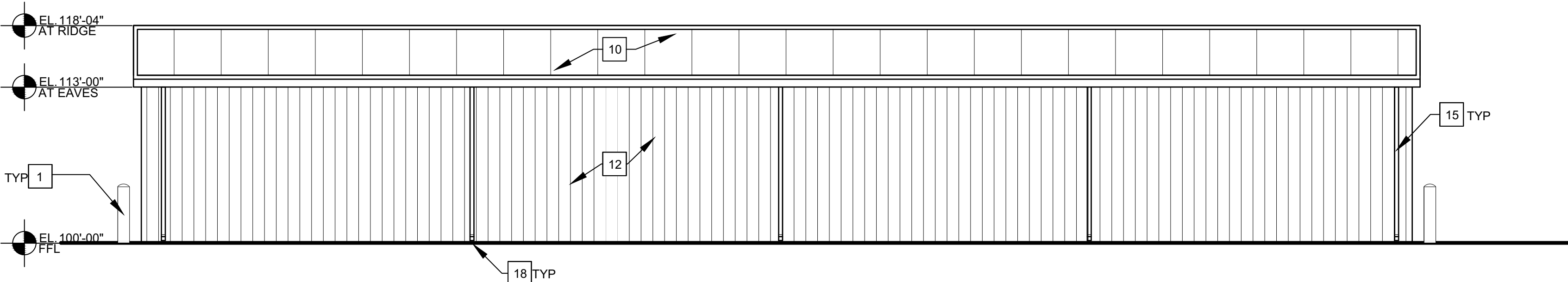
\* THIS DOCUMENT WAS PRODUCED BY OR UNDER THE AUTHORITY OF REGISTERED ARCHITECT STEVEN HULSEY. THIS DOCUMENT IS INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMIT OR CONSTRUCTION. DATE OF ISSUE: 02.25.2011



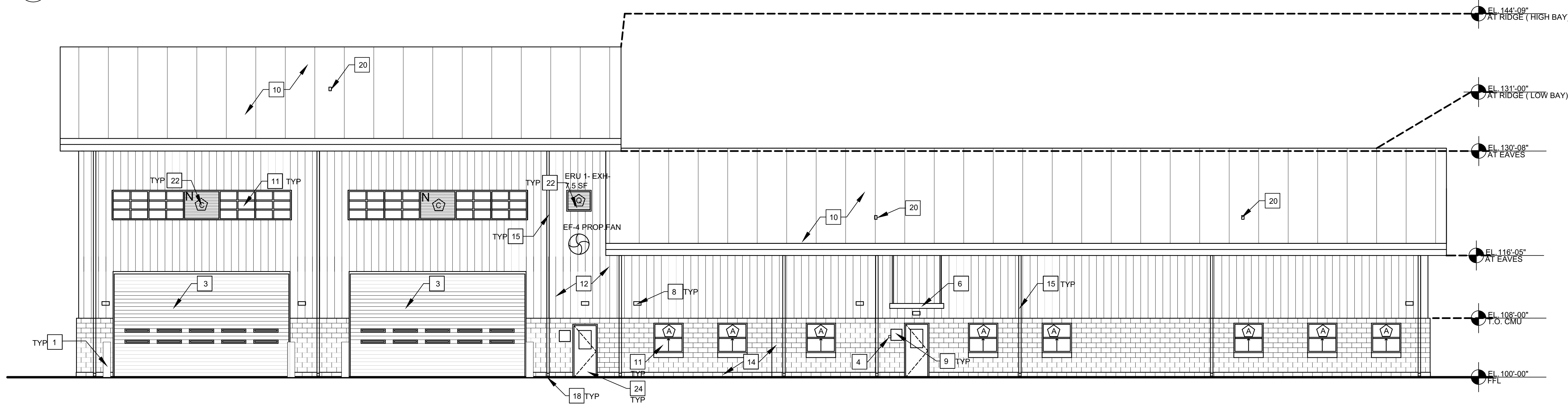
04 EAST & WEST ELEVATIONS OSB  
SCALE: 1/8" = 1'-0"



03 NORTH ELEVATION OSB  
SCALE: 1/8" = 1'-0"



02 SOUTH ELEVATION OSB  
SCALE: 1/8" = 1'-0"



01 SOUTH ELEVATION TEMF BLDG.  
SCALE: 1/8" = 1'-0"

#### GENERAL ELEVATION NOTES

1. SEE SHEET A-602 FOR EXTERIOR COLOR LEGEND.

#### KEYED ELEVATION NOTES

- |   |  |
|---|--|
| 1 | 12" DIA. CONCRETE FILLED STEEL BOLLARDS, PAINT SAFETY YELLOW, TYP.             |
| 2 | NOT USED   |
| 3 | 24'-0" X 14'-0" COILING OVERHEAD STEEL DOOR, COLOR TO MATCH ROOF PANELS (RP-1) |
| 4 | RECESSED KNOX BOX (4"x4"). EQUAL TO SERIES 3200 BY KNOX CO.; PHOENIX, AZ.      |
| 5 | NOT USED   |

- |    |   |
|----|---|
| 6  | ENTRY CANOPY, SEE ELEVATION & DETAILS ON SHEET A-304.           |
| 7  | CANOPY BEAM, PAINTED TO MATCH METAL ROOF PANELS. (RP-1)         |
| 8  | LIGHT FIXTURE, REF. ELECTRICAL                                  |
| 9  | ROOM IDENTIFICATION SIGNAGE, REF. A603,A105,A106                |
| 10 | PRE-FINISHED STRUCTURAL STANDING SEAM METAL ROOF PANELS (RP-1). |

- |    |   |
|----|---|
| 11 | BLAST MITIGATION ALUMINUM WINDOW. SEE WINDOW TYPE ELEVATIONS & DETAILS ON A-601 & A-703                     |
| 12 | PRE-FINISHED METAL WALL PANELS (WP-1).  |
| 13 | NOT USED  |
| 14 | SPLIT FACE CMU VENEER.(CMU-1)   |
| 15 | PRE-FINISHED CONT. GUTTER & DOWNSPOUT BY METAL BUILDING SYSTEM SUPPLIER, COLOR TO MATCH WALL PANELS (WP-1). |

- |    |  |
|----|--|
| 16 | RAKE TRIM BY METAL BLDG SYSTEMS SUPPLIER, COLOR TO MATCH WALL PANELS (WP-1). |
| 17 | TOOL STORAGE CONTAINERS, SEE FLOOR PLANS FOR TYPE AND LOCATION               |
| 18 | SPLASHBLOCK ON GRADE.  |
| 19 | 10'-0" X 10'-0" SECTIONAL STEEL DOOR, COLOR TO MATCH ROOF PANELS (RP-1).     |
| 20 | FALL ARRESTOR, SEE ROOF PLAN   |

- |    |  |
|----|--|
| 21 | CRICKET  |
| 22 | LOUVER COLOR TO MATCH MTL. ROOF PANELS ( RP-1) SEE SHEET A-601 & A-703 |
| 23 | BUILDING IDENTIFICATION SIGNAGE REF. A603,A105,A106                    |
| 24 | PERSONNEL DOOR, PAINT TO MATCH MTL ROOF PANELS ( RP-1) REF. A- 601     |



US ARMY CORPS  
OF ENGINEERS

REVISIONS	DATE	APPD
1	03.28.11	
95% CONSTRUCTION DOCUMENTS	DESCRIPTION	

Bristol  
DESIGN BUILD  
SERVICES, LLC

DATE: 03.28.11	SCALE:	DRAWING CODE	DATE: 03.28.11
DESIGNED BY: DAVID SAFIR	DRAWN BY:	CHECKED BY: DAVID SAFIR	PROJECT A/E: STEVEN HULSEY

U. S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS

CORGAN  
ASSOCIATES, INC.

FORT POLK, LOUISIANA  
TACTICAL EQUIPMENT MAINTENANCE FACILITY

SHEET TITLE :  
ELEVATIONS

CAL PROJECT : 10207.0000

SHEET  
IDENTIFICATION  
A-202  
SHEET : XXOFXX

## APPENDIX G

GIS Data

Not Used



## APPENDIX H

### Exterior Signage

# JRTC & Fort Polk Installation Design Guide



Final  
March 2006



Friday, April 29, 2011



### 11.4.13 Types of Signs

**11.4.13.1 Information / Identification Signs** These are signs that identify entrances to the installation, areas within the installation, major tenants, buildings, and organizational or functional components (Fig. 11.29). They identify a location and greet the visitor to that location. They should be compatible in scale and character with the architecture and also blend with the natural surroundings. These signs are designed to include the following:

#### 11.4.13.1.1 Typeface:

- Lettering is self-adhesive backing material.
- Building Title: Helvetica Medium, Upper and Lower Case
- Building Numbers: Helvetica regular
- Building Addresses: Helvetica Medium, Upper and Lower Case

#### 11.4.13.1.2 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed Panel Backs and Edges: Dark Brown
- All Paint: Semi-Gloss

#### 11.4.13.1.3 Materials:

- Panel: Double-Face 1/8" Thick Aluminum
- Post: Steel Pipe
- Foundation: Concrete Pier or Direct Burial

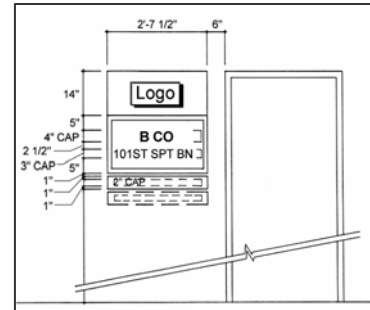
#### 11.4.13.1.4 Building Identification

**11.4.13.1.4.1 Street Addresses** The addressing procedures prescribed in [DoD 4525.8-M, DoD Official Mail Manual](#) are mandatory for use by all DoD components. DoD 4525.8-M, Chapter 3 prescribes the following:

All DoD addresses shall be assigned so they are compatible with the United States Postal Services automated delivery point sequencing (C3.3).

The DoD installation is responsible for assigning city-style, street address on the installation (C3.3.2.2).

Street addresses shall be assigned and used even though a DoD activity may deliver the mail to the addressee (C3.3.2.2.1).



**Fig. 11.29 – Building Mounted Information Sign**



**Fig. 11.30 – Use street addresses on all building identification signs.**

Only geographically locatable civilian-style street address (such as 4102 Cindy Avenue) shall be used (C3.3.2.2.4) (Fig. 11.30).

Installations shall not use one street address for the entire installation and then use secondary unit designators such as "Building 123" to designate the delivery addresses on the installation (C3.3.2.2.5).

Addresses such as "Building 123 Roberts Street" are not a valid address format and shall not be used (C3.3.2.2.6).

#### *11.4.13.1.4.2 Address Placement*

Place addresses by the front entrance of the building so they can be seen (C3.3.2.3.1).

Place both the street name and address number on the building if both the building number and street address are visible from the street.

Building identification signs will use street addresses (Fig. 11.29). Buildings without identification signs shall have the address number and street name centered above the main entrance or located to the right side (Fig. 11.31).

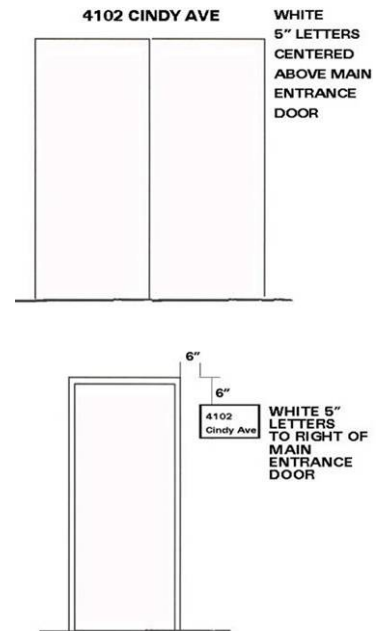
#### *11.4.13.1.5 Housing Areas*

*11.4.13.1.5.1* The sign should be complementary to the architectural setting of the housing area and approved by the installation Real Property Planning Board.

*11.4.13.1.5.2* Housing numbers should be placed on the curb in front of the respective house and on the house where lighting will effectively light the numbering.

#### *11.4.13.1.6 Installation Identification Signs.*

*11.4.13.1.6.1* Installation identification signs name the installation and display the official US Army plaque. The designation "United States Army" must appear at the top of the sign in accordance with [AR 420-70](#), para 2-7h. Every installation entrance shall have an installation identification sign displaying only the US Army plaque, with the words "United States Army, Joint Readiness Training Center & Fort Polk", and gate name (Fig. 11.32). The placement of Senior Mission Commander logo, unit crest, and other installation identification signs, monuments, or displays shall be located inside the installation beyond the cleared area of the Access Control Point (ACP) of entry. When used service-wide,



**Fig. 11.31 - Street address location at entrance doors.**



**Fig. 11.32 – Installation Entrance Signs**

these signs convey a uniform image of strength and stability to the public. Emblems, branch colors, unit mottos, names, and titles of individuals are not to be displayed.

11.4.13.1.6.2 Installation identification signs consist of three types:

- Sign type A1, main entrance sign, identifies the principal visitor entrance.
- Sign type A2, secondary entrance sign, identifies entry points with relatively high volumes of visitor traffic.
- Sign type A3, limited access entry gate signs, identifies entry points with limited public access.

11.4.13.1.6.3 See [Technical Manual \(TM\) 5-807-10, Signage](#), paragraph 3-3, for sign specifications and paragraph 3-11 for sign placement guidelines.

**11.4.13.1.7 Street Signs** Street name identification signs should be designed with the same lettering, color, and materials as other information (Fig. 11.33).

**11.4.13.1.8 Wheeled Electrical Signs** Wheeled electrical signs will have an attractive presentation. Temporary landscape elements should be used whenever possible. The siting of this type of sign will be approved by the RPPB. No sign of this type will be left in place for longer than six (6) months, after which time the sign will be removed or turned into a permanent sign.

**11.4.13.2 Directional Signs** These signs guide the motorist or pedestrian in, around, and out of the installation (Figs. 11.34 and 11.35). The legibility and placement of these signs, as well as the ordering of information, is critical to their effectiveness. These signs should be placed in central locations and at major decision points along circulation routes. These signs are designed to include the following:

#### ***11.4.13.2.1 Typeface:***

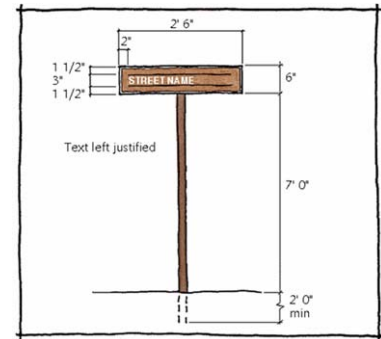
- Lettering is self-adhesive backing material.
- Helvetica Medium Upper and Lower Case

#### 11.4.13.2.2 Arrow:

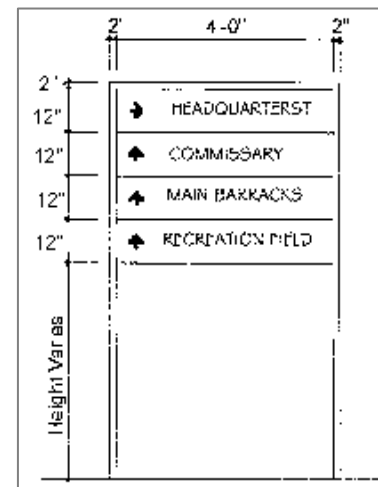
- Place at end indicating direction.
- Stroke Width: Helvetica Medium Cap

#### 11.4.13.2.3 Color:

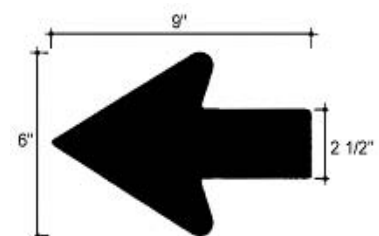
- Panel: Dark Brown



**Fig. 11.33 – Typical Street Signs**



**Fig. 11.34 – Direction Sign**



**Fig. 11.35 – Use a typical arrow on all destination signs.**

- Lettering: White
- Post: Dark Brown
- Exposed Panel Backs and Edges: Dark Brown
- All Paint: Semi Gloss

#### 11.4.13.2.4 Materials:

- Panel: Double-face 1/8" Thick Aluminum
- Post: Steel Pipe
- Foundation: Concrete Pier or Direct Burial

**11.4.13.3 Regulatory Signs** These signs provide the rules for travel and parking on the installation. They include speed signs, turning and lane use signs, warning signs, parking control signs, etc. (Figs. 11.36 and 11.37). Related to these signs are pavement markings and traffic signals. These signs are designed to include the following:

#### 11.4.13.3.1 Typeface:

- Lettering is self-adhesive backing material.
- Helvetica Medium Upper and Lower Case

#### 11.4.13.3.2 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed Panel Backs and Edges: Dark Brown
- All Paint: Semi Gloss

#### 11.4.13.3.3 Materials:

- Panel: Double-face 1/8" thick aluminum
- Post: Steel Pipe
- Foundation: Concrete Pier or Direct Burial

#### 11.4.13.3.4 Traffic Control Signs

**11.4.13.3.4.1 CONUS Installations** National highway standards will be used for signs to regulate vehicular traffic on CONUS installations ([AR 420-72, Transportation Infrastructure and Dams](#), Para 2-15f). These standards are described in the [Manual of Uniform Traffic Control Devices \(MUTCD\)](#). Also see [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#). This pamphlet clarifies existing standards and provides definite guidelines for installation officials to conform to the MUTCD. These standards shall be used installation-wide to include installation Access Control Points.

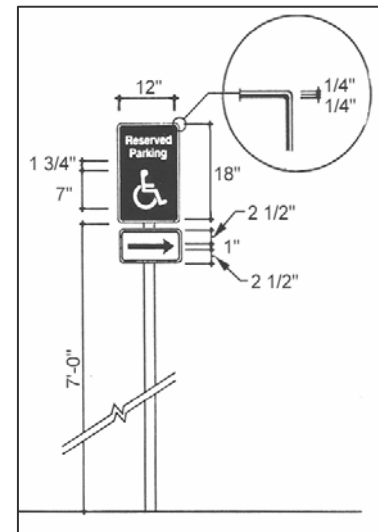


Fig. 11.36 – Regulatory sign.

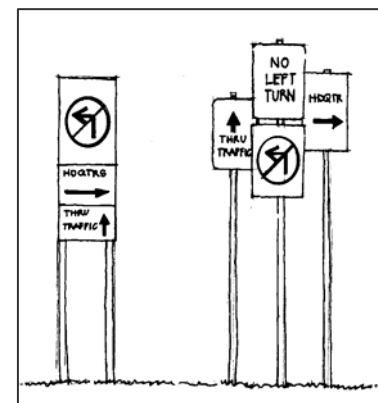


Fig. 11.37 – Sign should be simple, legible, and combined.



**11.4.13.3.4.2 OCONUS Installations** OCONUS installation streets and roads are to be considered extensions of the road system of the host nation and shall use traffic control device standards and criteria of the host nation ([AR 420-72, Transportation Infrastructure and Dams](#), Para 2-15e).

**11.4.13.3.5 Prohibitory (Warning) Signs** This category of signage is intended to maintain security and safety on the installation perimeter and at other specific secure areas. These signs notify visitors of restrictions as well as other security procedures. The guidelines for design, fabrication, and placement of warning signs are found in [Technical Manual \(TM\) 5-807-10, Signage, para 3-9](#).

### 11.4.14 Electronic Exterior Signs

All exterior flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.

### 11.4.15 Sign Placement and Mounting

Placement of signs differs according to the type of sign and the specific site constraints (Fig. 11.38). The following guidelines apply to placement of the majority of signs.

Do not place more than one sign at any location. Traffic rules are the exception to this rule.

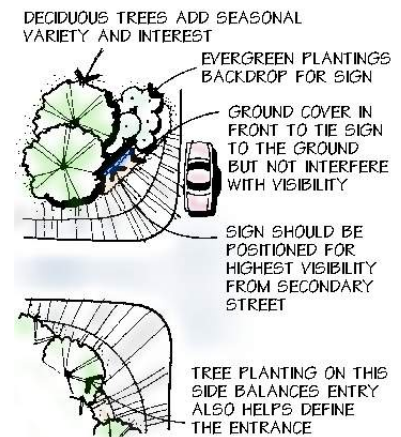
Place signs in areas free of visual clutter and landscape materials. Place signs in locations that allow enough time for the user to read and react to the message.

Signs should not be placed to block sight lines at intersections. Place signs approximately 1.2 meters (4 feet) above ground level to be within 10 degrees the driver's line of vision (Fig 11.39). Provide proper placement to avoid a hazard to children.

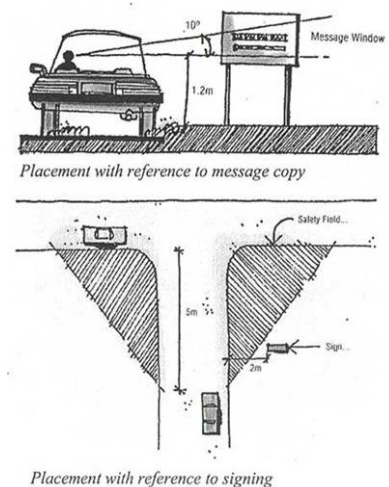
Locate identification signs generally at building entrances and/or other parts of the building visible from the main access street. Building signs should be visible from the main circulation paths to the building (vehicular or pedestrian).

Place building and/or facility identification signs within the first 20 percent of the distance closest to the road between the road and the building. These signs shall be placed as not to obscure any other identification, information or vehicular regulatory signs.

Signs unable to be located perpendicular to the direction of traffic may be rotated to a 45-degree angle or parallel to traffic.



**Fig. 11.38 – Consider basic planning and design objectives in sign placement.**



**Fig. 11.39 – Placement of signs is critical to ensure easy readability.**



The minimum distance between sign and driveway or intersection should normally be 100 feet.

One identification sign for each building is sufficient unless vehicular access occurs on two or more sides of the building.

Provide signs to identify facilities dedicated to or accessible to the handicapped, such as parking spaces, building entrances, and restroom facilities.

Mounting signs on buildings:

- No sign may be mounted on the outside of the door, except small signs (one square foot or less) that indicate required use of an alternate entrance. Signs such as "Escort Required" or changeable signs are not permitted.
- No sign may be attached or mounted to roofs and parapets.
- No sign shall be painted or applied directly onto the surface of a building.
- No permanent signs shall obstruct any window, door, fire escape, ladder, or opening intended for light, air, or egress.
- No temporary sign in windows or glass walls is allowed to cover more than 20 percent of the glass area.
- No signs shall interrupt the vertical and horizontal features of the facade.
- No sign may be tacked, posted, painted, or otherwise affixed to site elements such as sheds, trees, or other structures.
- No sign may be attached to utility poles except for pole identification or warning signs.
- Fasten projecting signs directly to the supporting building wall and integrate the frame into the sign. These signs shall intersect at right angles to the building front and shall not extend above the roofline or the parapet wall. Signs may not project more than five

feet from a wall or two-thirds the width of the sidewalk, whichever is less. In no case may signs be closer than 18 inches to the curb line. A clear height of eight feet above the ground is required.

#### **11.4.16 Sign Details**

Signage details include the following:

- All signs will either be pre-manufactured or fabricated by DPWE. Low quality and “homemade” type signs are prohibited.
- Any sign that is mechanically animated (i.e., revolves, rotates, or moves in any way) is prohibited.
- Locate signs where they are most visible and the view unobstructed.
- Signs will be brown Federal Specification Color Number 20140 and white (i.e., Park Service colors).
- Universally recognized color schemes such as the state highway and safety signs may follow the Federal Highway Administration’s “Standard Alphabets for Highway Signs and Pavement Markings” standards.
- Signs generally are not landscaped; however, if ornamental planting occurs in the vicinity of the sign, locate the sign in the planting bed.
- Temporary signs do not require landscaping; changeable signs are not considered temporary.
- Any exposed lighting tubes, strings of lights, spotlights, or any illumination that causes direct glare upon an unrelated building are prohibited.
- Any flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.
- Signs may be lit by remote lamps or backlit where nighttime identification is required such as at clubs, shopping areas, and post entry points.
- Internally lit signs must have an opaque message surface displayed at all times, and at no period will views be allowed to the inside of the sign regardless of whether a message is on the sign or not.

- Kiosks, informational signs, and “You Are Here” maps are to be centrally located in “Activity Nodes” as defined by the District Plate graphics.
- For military building signs, quantities are limited to one of each type allowed.
- Quantities are limited regardless of whether facilities are located on corners, have exposure to multiple roads/drives, or have building entrances visually separated from roads/parking lots.
- All signs use Helvetica font (Fig 11.40).
- Traffic signs will follow guidelines in the Federal Highway Administration’s “Standard Alphabets for Highway Signs and Pavement Markings” standards.

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz

**Fig. 11.40 – Use Helvetica type style on signage.**

### 11.4.17 Sign System Typography

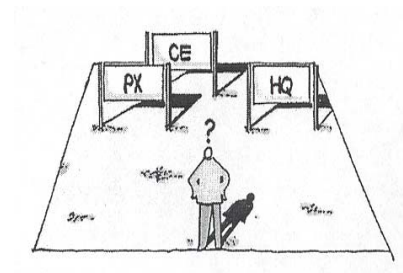
**11.4.17.1 Military Emblems** The Army has a rich tradition of military heraldry. Military emblems are an important part of the soldiers' identity and the emblems have been carefully crafted over the years to express unit pride and unique history and function of the unit. The care and use of organizational emblems in a signage system can add visual interest as well as build pride and a sense of history. However, the overuse of miscellaneous emblems can lead to clutter and a dilution of their importance. Colors for military emblems must be in accordance with the Institute of Heraldry.

**11.4.17.2 Department of the Army Plaque** The plaque should be displayed on installation identification signage to emphasize the heritage and professionalism of the United States Army. The design of the plaque must be in accordance with [Army Regulation \(AR\) 840-1, Department of the Army Seal, and Department of the Army Emblem and Branch of Service Plaques](#), and must be reproduced in full color.

**11.4.17.3 Insignias** The use of branch insignia, shoulder sleeve insignia, coat of arms and/or distinctive insignia on headquarters signs is permitted. All military emblems must appear in full color. Motivational symbols or motifs will not be used.

### 11.4.18 Reduce Visual Clutter

**11.4.18.1** Over-signing detracts from a uniform sign system and if left uncontrolled will eventually destroy the integrity of the system.



**Fig. 11.41 – Visual clutter causes confusion.**

APPENDIX I  
Acceptable Plant List

# JRTC & Fort Polk Installation Design Guide



Final  
March 2006



Friday, April 29, 2011



Links

[Go to Appendix P](#)

[Go to Table of Contents](#)

THIS PAGE INTENTIONALLY LEFT BLANK



Plant Material Suitability Matrix												Function							Soil Moisture			Resistant			Salt Tolerant			Light			Interest			Flower			Growth			Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Botanical Name												Common Name												Use			Culture			Sun/shade			Medium			High			Drought		Pest		Moist			Average			Dry			Street tree			Shade tree			Screen			Massing			Windbreak			Hedge			Bank cover			Specimen																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
												SHADE TREES												SHADE TREES												SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES			SHADE TREES		

Plant Material Suitability Matrix																															
Botanical Name		Common Name		Characteristics										Culture					Use												
Type		Growth			Flower			Interest			Light			Salt Tolerant			Resistant		Soil Moisture			Function									
		Slow	Medium	Fast	Fall	Summer	Spring	Flower	Bark	Foliage	Shade	Sun/shade	Sun	Low	Medium	High	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover	Specimen		
EVERGREEN TREES																															
<i>Magnolia grandiflora</i>																															X
<i>Ilex vomitoria</i>																															
<i>Vitex trifolia</i>		X				X						X			X						X			X				X		X	X
<i>Myrica cerifera</i>		X						X				X									X			X				X		X	X
SHRUBS																															
<i>Abelia x grandiflora</i>								X																			X		X		X
<i>Feijoa sellowiana</i>		X	X					X						X				X						X				X		X	
<i>Aucuba japonica</i>		X																X								X		X		X	
<i>Buxus microphylla</i>		X						X										X										X			
<i>Chaenomeles speciosa</i>		X															X									X					X
<i>Berberis thunbergii</i>		X	X					X										X								X					
<i>Callicarpa Americana</i>		X														X										X		X		X	X
<i>Calycanthus floridus</i>		X				X												X													
<i>Elaeagnus pungens</i>										X																			X		
<i>Forsythia spp.</i>		X	X																												X
<i>Gardenia jasminoides</i>																													X		X
<i>Hibiscus syriacus</i>		X	X																												X
<i>Ilex crenata</i>			X					X																				X		X	
<i>Myrica cerifera</i>			X																									X		X	

Plant Material Suitability Matrix														Function																
Type		Growth			Flower			Interest			Light			Salt Tolerant			Resistant		Soil Moisture			Use								
Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Flower	Bark	Foliage	Shade	Sun/shade	Sun	Low	Medium	High	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover	Specimen	
Botanical Name	Common Name		Characteristics												Culture			Use												
<i>Philadelphus coronarius</i>		Mock Orange						X	X	X		X	X				X		X	X	X			X						
<i>Nandina domestica</i>		Dwarf Nandina		X				X		X	X	X	X			X	X		X	X	X			X			X	X		
<i>Nerium oleander</i>		Oleander				X				X	X	X	X				X		X	X	X			X			X	X		
<i>Raphiolepis indica</i>		Indian Hawthorn					X	X		X		X	X							X				X			X	X		
<i>Rhododendron spp.</i>		Azalea				X	X	X				X	X						X	X					X				X	
<i>Spirea spp.</i>	X	Spirea					X	X		X	X	X	X				X		X	X	X				X				X	
GROUNDCOVERS/VINES																														
<i>Gardenia jasminoides</i>		Dwarf Gardenia				X	X	X		X		X	X												X				X	
<i>Hosta spp.</i>	X	Hosta		X		X		X		X		X	X						X							X		X		
<i>Trachelospermum asiaticum</i>		Asian Jasmine							X			X	X						X									X		
<i>Liriope muscari</i>		Liriope		X		X		X		X		X	X						X		X				X					
<i>Clematis spp.</i>	X	Clematis		X		X	X	X					X							X					X	X				
<i>Gelsemim sempervirens</i>		Carolina Jasmine			X		X	X				X	X							X					X	X	X	X		
<i>Trachelospermum jasminiolides</i>		Confederate Jasmine			X		X	X				X	X							X					X	X	X	X		
GRASSES																														
<i>Cynodon dactylon</i>		Bermuda (Common)				X		X		X	X	X	X						X	X								X		

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX J

Drawings: 115<sup>th</sup> Medical Company Operations Facility

## Drawing Index

A -101	Floor Plan – 115 <sup>th</sup> Company Operations Facility
A -102	Elevation – 115 <sup>th</sup> Company Operations Facility

\$DATE\$ \$FILE\$

A

B

C

D

1

2

3

4

5

- ELEVATION KEYED NOTES
- 1 TA-50 GEAR STORAGE LOCKERS (TYPICAL).
  - 2 MEZZANINE AREA ABOVE TA-50 STORAGE FOR ADDITIONAL UNIT STORAGE.
  - 3 PROVIDE LARGE DOUBLE DOORS, 6'-4"W X 8'-0"H AT BACK OF READINESS MODULE.
  - 4 WIRE MESH PARTITIONS AND CEILINGS AS INDICATED.
  - 5 CAST IN PLACE CONCRETE ENCLOSURE, ALL WALLS AND CEILING.
  - 6 HEAVY DUTY HOLLOW METAL DOORS, MIN 16 GAUGE, REQUIRED.
  - 7 BOOT WASH STATION WITH HOSE BIBB LOCATIONS.

RFP SUBMITTAL  
NOT FOR  
CONSTRUCTION



Date	Action	D.O. NO.	Description	Symbol

Rev.	Date: JUNE 2010
Soil No.	
Contr. No.	
Designed by: LACADEMIA	
Dwn by: LACADEMIA	
Reviewed by: T. MOWEN	
Submitted by: KUNG M. NG, PE	
ENGINEER	
File name: Plot date: JUN. XX, 2010 Plot scale: AS SHOWN	

U.S. ARMY ENGINEER DISTRICT,  
CORPS OF ENGINEERS  
FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.  
CONSULTING ENGINEERS  
AND ARCHITECTS  
SAN ANTONIO, TEXAS 78201  
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
115TH HOSPITAL UNIT  
PROJECT NO. 069199

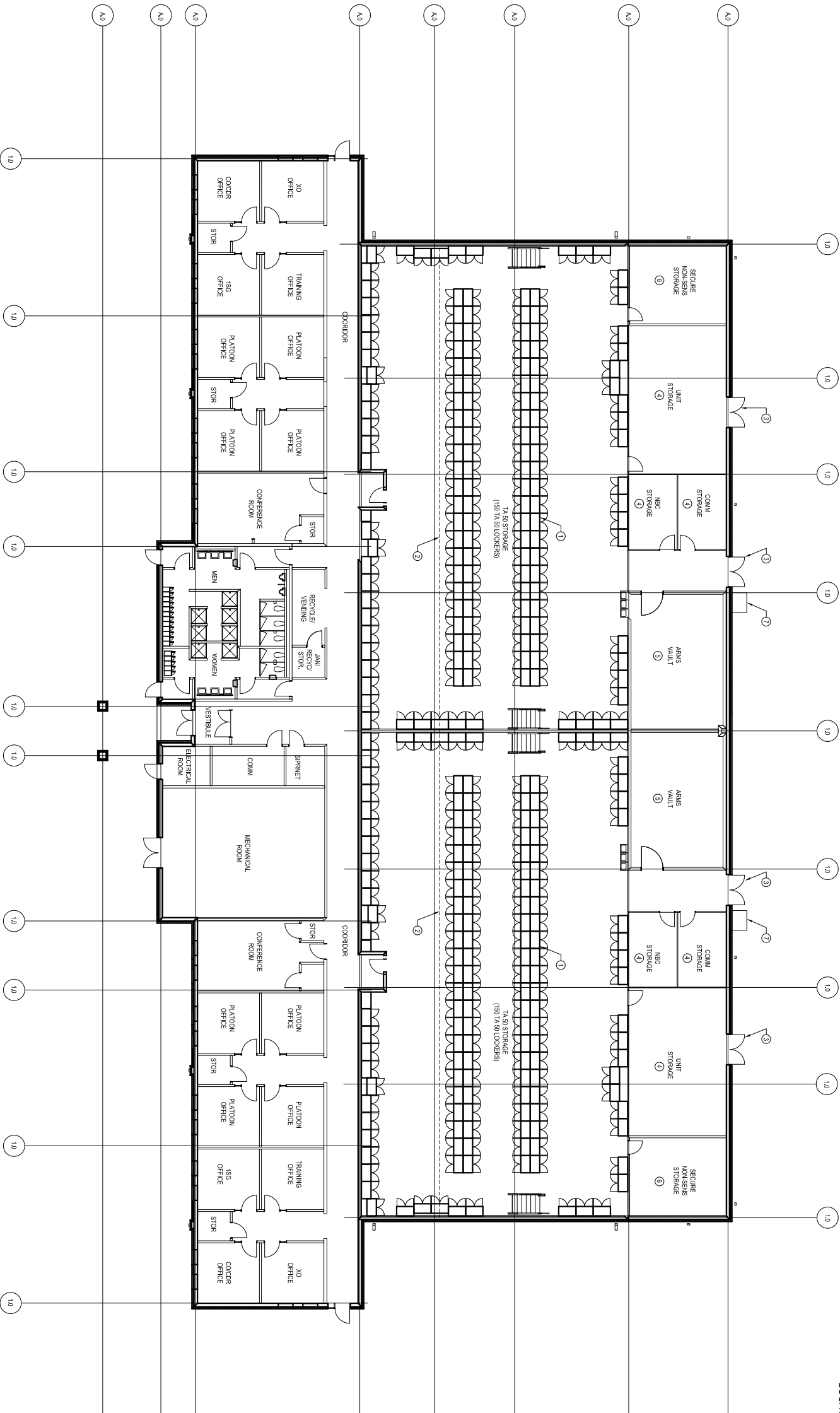
ELEVATIONS

Sheet reference number:  
A-102A

Sheet XXX of X

2 115TH HOSPITAL COMPANY OPERATIONS FACILITY

A-102A / 3/52" = 1'-0"



\$DATE\$ \$FILE\$

A

B

C

D

1

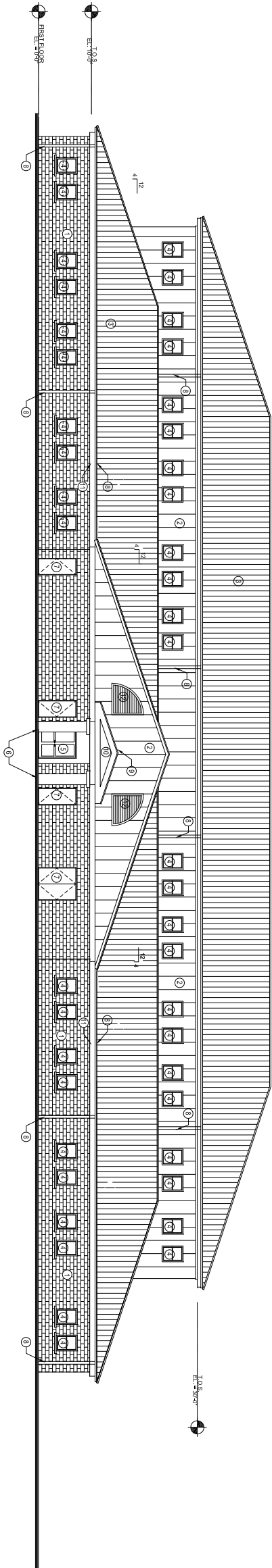
2

3

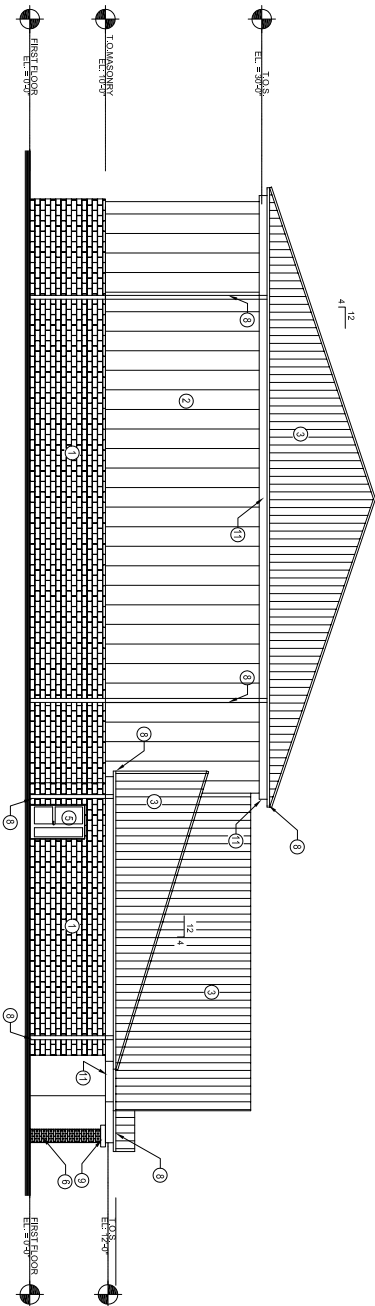
4

5

2 115TH HOSPITAL COMPANY OPERATIONS FACILITY  
A-102 3/32" = 1' 0"



1 115TH HOSPITAL COMPANY OPERATIONS FACILITY  
A-102 3/32" = 1' 0"



PREFERRED ELEVATION COLOR/ MATERIAL SCHEME		
SURFACE	PREFERRED MATERIAL	PREFERRED COLOR
LOWER WALL	SPLIT FACE CMU	NATURAL STONE
UPPER WALL	METAL PANELS	PANTONE 12-0910 TPX "CUSTARD"
ROOF	STANDING SEAM	METAL BRONZE
STOREFRONT	ALUMINUM	ANODIZED ALUMINUM
GUTTER/ DOWNSPOUT	METAL	PANTONE 16-1221 TPX "BROWN"
DOORS/ FRAMES	HOLLOW METAL	PANTONE 16-1221 TPX "BROWN"
WINDOWS/ LOUVERS	HOLLOW METAL	PANTONE 18-1027 TPX "DARK BROWN"
FASCIA	METAL	WHITE
CORNICE	EFIS	WHITE
COLUMN CAPTOLS	EFIS	WHITE
COLUMNS	BRICK	TAN

ELEVATION KEYED NOTES

- SPLIT FACE CMU UP TO 10' ABOVE FINISH FLOOR, COLOR: "NATURAL STONE".
- PRE FINISHED INSULATED METAL PANELS FROM TOP OF CMU TO UNDERSIDE OF ROOF OVER EXTERIOR GRADE GYPSUM SHEATHING WITH A CONTINUOUS AIR BARRIER SYSTEM ON STEEL STUDS, COLOR: "CUSTARD" PANTONE 12-0910 TPX.
- PRE FINISHES STANDING SEAM METAL ROOF (SSMR) SYSTEM, COLOR: "METAL BRONZE".
- ALUMINUM BLAST PROOF WINDOW COMPLYING WITH ATF/P REQUIREMENTS, COLOR: "DARK BROWN" PANTONE 16-1027 TPX.
- ALUMINUM STOREFRONT MAIN ENTRANCE DOOR, COLOR: ANODIZED ALUMINUM.
- BRICK COLUMNS TO BE LOCATED ON THE MAIN ENTRANCE COLUMNS, COLOR: "TAN BRICK".
- HOLLOW METAL DOORS AND FRAMES, COLOR: "DARK BROWN" PANTONE 18-1027 TPX.
- PRE FINISHED METAL GUTTERS AND DOWN SPOUTS, COLOR: "BROWN" PANTONE 16-1221 TPX.
- EFIS COLUMN CAPITOL, COLOR: "WHITE".
- EFIS CORNICE, COLOR: "WHITE".
- FASCIA, COLOR: "WHITE".
- PRE FINISHED METAL LOUVERS, COLOR: "DARK BROWN" PANTONE 18-1027 TPX.



RFP SUBMITTAL  
NOT FOR  
CONSTRUCTION

Date	Action	D.O. NO.	Description	Symbol

Rev.	Date: MARCH 2011
Soi No.	
Contr No.	
File name:	Plot date: JUN. XX, 2010
Plot scale:	AS SHOWN
Designed by: L. ACADEMIA	Reviewed by: T. MCWEN
Submitted by: KUNG M. NG, PE	ENGINEER

U.S. ARMY ENGINEER DISTRICT,  
CORPS OF ENGINEERS  
FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.  
CONSULTING ENGINEERS  
SAN ANTONIO, TEXAS 78201  
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
115TH HOSPITAL UNIT  
PROJECT NO. 069199

ELEVATIONS

Sheet reference number:  
A-102



## APPENDIX K

### Fuel Cost Information

## APPENDIX K Fuel Cost Information

The following utility rates for this installation are provided for design

**Electrical:**

Energy Charge - \$ 0.0797 per kilowatt-hour

**Natural Gas:**

Commodity Charge Rate - \$ 7.915 per thousand cubic feet

**Water:**

Commodity Charge Rate - \$2.0463 per thousand gallons

**Sewer:**

Commodity Charge Rate - \$2.4176 per thousand gallons

**Refuse Material:**

Commodity Charge Rate - \$13.60 per cubic yard

## APPENDIX L

### LEED Project Credit Guidance

**LEED Project Credit Guidance (OCT 09)**

This spreadsheet indicates Army required credits, Army preferred credits, project-specific ranking of individual point preferences, assumptions guidance for individual credits, and references to related language in the RFP for individual credits.

LEED 2.2 Credit Paragraph	LEED Project Credit Guidance	Army Guidance: Required - Preferred - Avoid	Project Preference Ranking: (1=most preferred, blank=no preference, X=preference not applicable to this credit, Rqd=required)	
PAR	FEATURE			REMARKS
<b><u>SUSTAINABLE SITES</u></b>				
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
SS1	Site Selection		1	See paragraph LEED CREDITS COORDINATION.
SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	See paragraph LEED CREDITS COORDINATION.

	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	See paragraph LEED CREDITS COORDINATION.
SS3	Brownfield Redevelopment		X	See paragraph LEED CREDITS COORDINATION.
SS4.1	Alternative Transportation: Public Transportation Access			See paragraph LEED CREDITS COORDINATION.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Pref	1	Assume that non-transient building occupants are NOT housed on Post unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1			Requires provision of vehicles, which cannot be purchased with construction funds. Assume Government will not provide vehicles unless indicated otherwise. Assume that 50% of GOV fleet is NOT alternative fuel vehicles unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3		X	Requires provision of vehicle refueling stations. Installation must support type of fuel and commit to maintaining/supporting refueling stations.
SS4.4	Alternative Transportation: Parking Capacity	Pref		
SS5.1	Site Development: Protect or Restore Habitat		1	

SS5.2	Site Development: Maximize Open Space	Pref		Assume AGMBC option for aggregated open space at another location on the installation is not available to the project unless indicated otherwise.
SS6.1	Stormwater Design: Quantity Control	Pref	1	See paragraph STORMWATER MANAGEMENT.
SS6.2	Stormwater Design: Quality Control	Pref	1	See paragraph STORMWATER MANAGEMENT.
SS7.1	Heat Island Effect: Non-Roof		1	
SS7.2	Heat Island Effect: Roof	Pref	1	Coordinate with nearby airfield requirements, which may preclude this credit.
SS8	Light Pollution Reduction	Pref	1	
<b><u>WATER EFFICIENCY</u></b>				
WEPR1	Water Use Reduction (Version 3 only)	Rqd	Rqd	All LEED prerequisites are required to be met.
WE1.1	Water Efficient Landscaping: Reduce by 50%	Pref	1	See paragraph IRRIGATION. Project must include landscaping to be eligible for this credit.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	Pref	1	Project must include landscaping to be eligible for this credit.
WE2	Innovative Wastewater Technologies - OPTION 1		1	
WE2	Innovative Wastewater Technologies - OPTION 2			
WE3	Water Use Reduction	Pref	1	See paragraph BUILDING WATER USE REDUCTION.
<b><u>ENERGY AND ATMOSPHERE</u></b>				
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.

EAPR2	Minimum Energy Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EA1	Optimize Energy Performance	Rqd	Rqd (7 pts)	Earning of LEED EA1 points as indicated in paragraph <b>ENERGY CONSERVATION</b> , as a minimum, is required.
EA2.1	On-Site Renewable Energy	Pref		See paragraph <b>ENERGY CONSERVATION</b> .
EA3	Enhanced Commissioning			The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise.
EA4	Enhanced Refrigerant Management		1	
EA5	Measurement & Verification		1	Assume Government will not provide post-occupancy activities unless indicated otherwise.
EA6	Green Power		X	See paragraph LEED CREDITS COORDINATION.
<b>MATERIALS AND RESOURCES</b>				
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Coordinate with Installation during design development on collection service and receptacles.

MR1	Building Reuse			
MR2.1	Construction Waste Management: Divert 50% From Disposal	Pref	1	See paragraph CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.
MR2.2	Construction Waste Management: Divert 75% From Disposal	Pref		
MR3	Materials Reuse			
MR4.1	Recycled Content: 10% (post- consumer + 1/2 pre-consumer)	Pref	1	See paragraph RECYCLED CONTENT.
MR4.2	Recycled Content: 20% (post- consumer + 1/2 pre-consumer)	Pref	1	
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally			
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally			
MR6	Rapidly Renewable Materials	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS and paragraph FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM.
MR7	Certified Wood	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS.
<b>INDOOR ENVIRONMENTAL QUALITY</b>				



EQPR1	Minimum IAQ Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Assume all buildings are smoke free unless indicated otherwise (family housing, barracks and other lodging are facility types where smoking may be permitted in some cases).
EQ1	Outdoor Air Delivery Monitoring			
EQ2	Increased Ventilation			
EQ3.1	Construction IAQ Management Plan: During Construction	Pref	1	See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	Pref	1	See paragraph LOW-EMITTING MATERIALS.
EQ4.2	Low Emitting Materials: Paints & Coatings	Pref	1	See paragraph LOW-EMITTING MATERIALS.
EQ4.3	Low Emitting Materials: Carpet/Flooring Systems	Pref	1	See paragraph LOW-EMITTING MATERIALS.
EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	Pref	1	See paragraph LOW-EMITTING MATERIALS.
EQ5	Indoor Chemical & Pollutant Source Control	Pref		System requiring weekly cleaning to earn this credit is not a permitted option unless indicated otherwise.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design	Pref	1	See paragraph APPLICABLE CRITERIA

EQ7.2	Thermal Comfort: Verification			Project must earn credit EQ7.1 to be eligible for this credit. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	Pref	1	See paragraph DAYLIGHTING.
EQ8.2	Daylight & Views: Views for 90% of Spaces	Pref		
<b>INNOVATION &amp; DESIGN PROCESS</b>				
IDc1.1	Innovation in Design			See paragraph INNOVATION AND DESIGN CREDITS. Assume Government will not provide any activities associated with ID credits.
IDc1.2	Innovation in Design			
IDc1.3	Innovation in Design			
IDc1.4	Innovation in Design			
IDc2	LEED Accredited Professional	Rqd	Rqd	LEED AP during design and construction is required.
<b>REGIONAL PRIORITY CREDITS (Version 3 only)</b>				See paragraph LEED CREDITS COORDINATION.

## APPENDIX M

### LEED Owner's Project Requirements

APPENDIX N  
LEED Requirements for Multiple Contractor Combined Projects

Not Used

APPENDIX O  
LEED Strategy Tables

LEED Credit Paragraph		Building Design Substitution Permitted	Sitework Substitution Permitted	Required Points Strategy	<p>YELLOW ITEMS: Sitework to achieve this credit and provide documentation for each building. GREEN ITEMS: Each building to achieve this credit. BROWN ITEMS: Both the Sitework and each Building to achieve this credit independently and in coordination with one another.</p>
<b>LEED 2.2 Strategy Table</b>					

**BUILDING: COMPANY OPERATIONS FACILITIES**

PAR	FEATURE				REMARKS
<b>CATEGORY 1 – SUSTAINABLE SITES</b>					
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	NO	NO	R	Contractor is primary permittee. Adjacent COF contractor is secondary permittee.
SS1	Site Selection	NO	NO	1	Combined Bldg/Site credit. Both contractors shall be responsible for maintaining critical construction clearances.
SS2	Development Density & Community Connectivity	NIC	NIC		
SS3	Brownfield Redevelopment	NIC	NIC		
SS4.1	Alternative Transportation: Public Transportation Access	NIC	NIC		
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	NO	NO	1	Combined Bldg/Site credit. Sitework includes bicycle racks. Adjacent COF contractor responsible for documenting adjacent shower and changing rooms.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	NIC	NO	1	Sitework includes signage that reserves the closest (excluding handicapped spaces) 5% of the total vehicle parking spaces for low-emitting and fuel-efficient vehicles per Option 2.
SS4.4	Alternative Transportation: Parking Capacity	NIC	NO	1	Sitework includes signage that reserves the next closest (excluding handicapped and low-emitting/fuel efficient vehicle spaces) 5% of the total vehicle parking spaces for carpools and vanpools per Option 1.
SS5.1	Site Development: Protect or Restore Habitat	NIC	NIC		
SS5.2	Site Development: Maximize Open Space	NIC	NO	1	Sitework shall include for this area.
SS6.1	Stormwater Design: Quantity Control	NIC	NIC		
SS6.2	Stormwater Design: Quality Control	NIC	NIC		
SS7.1	Heat Island Effect: Non-Roof	NIC	NO	1	Sitework shall provide for this credit.
SS7.2	Heat Island Effect: Roof	NO	NIC	1	Building design shall be responsible for providing.
SS8	Light Pollution Reduction	NO	NO	1	Combined Bldg/Site credit. Building design shall be responsible for building lighting requirements. Sitework shall provide for for site lighting requirements.
<b>CATEGORY 2 – WATER EFFICIENCY</b>					
WE1.1	Water Efficient Landscaping: Reduce by 50%	NO	NIC	1	Building design shall provide as part of their landscaping package.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	NO	NIC	1	Building design shall provide as part of their landscaping package.
WE2	Innovative Wastewater Technologies	YES	YES		Proposed credit must wholly fall within contractor scope or be coordinated with the other contractor.
WE3.1	Water Use Reduction: 20% Reduction	NO	NIC	1	Building design shall provide for this credit.

LEED Credit Paragraph		Building Design Substitution Permitted	Sitework Substitution Permitted	Required Points Strategy	YELLOW ITEMS: Sitework to achieve this credit and provide documentation for each building. GREEN ITEMS: Each building to achieve this credit. BROWN ITEMS: Both the Sitework and each Building to achieve this credit independently and in coordination with one another.
<b>LEED 2.2 Strategy Table</b>					

**BUILDING: COMPANY OPERATIONS FACILITIES**

PAR	FEATURE				REMARKS
WE3.2	Water Use Reduction: 30% Reduction	NO	NIC	1	Building design shall provide for this credit.
<b>CATEGORY 3 – ENERGY AND ATMOSPHERE</b>					
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	NO	NO	1	Combined Bldg/Site credit. Sitework shall be responsible for commissioning of site lighting. Building design shall provide for associated commissioning of required building systems.
EAPR2	Minimum Energy Performance (PREREQUISITE)	NO	NIC	R	Building design shall provide for this credit.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	NO	NIC	R	Building design shall provide for this credit.
EA1	Optimize Energy Performance	YES	NIC	6	Building design shall include; must comply with EPACT.
EA2	On-Site Renewable Energy	YES	YES		Proposed credit must wholly fall within contractor scope or be coordinated with the other contractor.
EA3	Enhanced Commissioning	NIC	NIC		
EA4	Enhanced Refrigerant Management	YES	NIC	1	Building design shall provide for this credit.
EA5	Measurement & Verification	YES	NIC		Building design shall provide for this credit.
EA6	Green Power	NIC	NIC		

**CATEGORY 4 – MATERIALS AND RESOURCES**

MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	NO	NIC	R	Building design shall provide for this prerequisite.
MR1.1	Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	N/A	N/A		
MR1.2	Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	N/A	N/A		
MR1.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements	N/A	N/A		
MR2.1	Construction Waste Management: Divert 50% From Disposal	NO	NO	1	Combined Bldg/Site credit. Each contractor shall be responsible for diverting the minimum waste from disposal.
MR2.2	Construction Waste Management: Divert 75% From Disposal	NO	NO	1	Combined Bldg/Site credit. Each contractor shall be responsible for diverting the minimum waste from disposal.
MR3.1	Materials Reuse: 5%	NIC	NIC		
MR3.2	Materials Reuse: 10%	NIC	NIC		
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	NO	NO	1	Combined Bldg/Site credit. Each contractor shall be responsible for the minimum recycled content.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	YES	YES		
MR5.1	Regional Materials: 10% Extracted, Processed & Manufactured Regionally	NO	NO	1	Combined Bldg/Site credit. Each contractor shall be responsible for the minimum regional materials.

LEED Credit Paragraph	LEED 2.2 Strategy Table	Building Design Substitution Permitted	Sitework Substitution Permitted	Required Points Strategy	YELLOW ITEMS: Sitework to achieve this credit and provide documentation for each building. GREEN ITEMS: Each building to achieve this credit. BROWN ITEMS: Both the Sitework and each Building to achieve this credit independently and in coordination with one another.
-----------------------	-------------------------	--	---------------------------------	--------------------------	---

**BUILDING: COMPANY OPERATIONS FACILITIES**

PAR	FEATURE				REMARKS
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally	NIC	NIC		
MR6	Rapidly Renewable Materials	YES	NIC		
MR7	Certified Wood	YES	NIC	1	Building design shall provide for this credit.

**CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY**

EQPR1	Minimum IAQ Performance (PREREQUISITE)	NO	NIC	R	Building design shall provide for this prerequisite.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	NO	NIC	R	Smoking is prohibited in non-residential Federal facilities. Building design shall provide for all ETS control features.
EQ1	Outdoor Air Delivery Monitoring	YES	NIC	1	Building design shall provide for this credit.
EQ2	Increased Ventilation	YES	NIC		
EQ3.1	Construction IAQ Management Plan: During Construction	YES	NIC	1	Building design shall provide for this credit.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	YES	NIC	1	Building design shall provide for this credit.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	YES	NIC	1	Building design shall provide for this credit.
EQ4.2	Low Emitting Materials: Paints & Coatings	YES	NIC	1	Building design shall provide for this credit.
EQ4.3	Low Emitting Materials: Carpet Systems	YES	NIC	1	Building design shall provide for this credit.
EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	YES	NIC	1	Building design shall provide for this credit.
EQ5	Indoor Chemical & Pollutant Source Control	YES	NIC	1	Building design shall provide for this credit.
EQ6.1	Controllability of Systems: Lighting	YES	NIC	1	Building design shall provide for this credit.
EQ6.2	Controllability of Systems: Thermal Comfort	YES	NIC		
EQ7.1	Thermal Comfort: Design	YES	NIC		
EQ7.2	Thermal Comfort: Verification	YES	NIC		
EQ8.1	Daylight & Views: Daylight 75% of Spaces	YES	NIC		
EQ8.2	Daylight & Views: Views for 90% of Spaces	YES	NIC		

**CATEGORY 6 – FACILITY DELIVERY PROCESS**

IDc1.1	Innovation in Design	YES	YES		For development of the ID credits, the contractor shall assume the Government will not provide any additional support or post-occupancy activities. ID credits must also be submitted to the Government and approved prior to its use/incorporation.
IDc1.2	Innovation in Design	YES	YES		
IDc1.3	Innovation in Design	YES	YES		

Friday, April 29, 2011



LEED Credit Paragraph	<b>LEED 2.2 Strategy Table</b>	Building Design Substitution Permitted	Sitework Substitution Permitted	Required Points Strategy	YELLOW ITEMS: Sitework to achieve this credit and provide documentation for each building. GREEN ITEMS: Each building to achieve this credit. BROWN ITEMS: Both the Sitework and each Building to achieve this credit independently and in coordination with one another.
-----------------------	--------------------------------	--	---------------------------------	--------------------------	---

**BUILDING: COMPANY OPERATIONS FACILITIES**

PAR	FEATURE				REMARKS
IDc1.4	Innovation in Design	YES	YES		
IDc2	LEED Accredited Professional	NO	NO	1	Combined Bldg/Site credit. All contractors shall be responsible for having a LEED Accredited Professional on staff, directly involved and responsible for documenting and achieving each credit.
	<b>TOTAL</b>			<b>35</b>	<b>LEED Silver requires a minimum of 33 points.</b>

## APPENDIX P

### USGBC Registration of Army Projects

## APPENDIX P

### USGBC Registration of Army Projects

#### **Typical Registration Procedure**

1. Complete the online registration form (see guidance below) at the USGBC website <http://www.usgbc.org/showfile.aspx?documentid=875> and submit it online.
2. Pay the registration fee via credit card (USACE staff: credit card PR&C is funded by project design or S&A funds).
3. The USGBC will follow up with a final invoice, the LEED-online passwords and template information.
4. If you have any questions, the USGBC contact (as of October 08) is:  
Courtney Yan, LEED Program Assistant  
U.S. Green Building Council  
202/587-7180  
[cyan@usgbc.org](mailto:cyan@usgbc.org)

#### **Completing the Registration Form**

##### **BEFORE YOU BEGIN:**

**Create a personal account with USGBC if you do not have one.**

**You will need the following information:**

**Project name as it appears in P2 (obtain from USACE Project Manager)**

**Building number/physical address of project**

**Zip code for Installation/project location**

**Total gross area all buildings in project**

**Total construction cost for buildings only (see Project Details Section instructions below)**

##### **ACCOUNT/LOGIN INFORMATION SECTION**

1. The person registering the project **must have an account with USGBC** (login and password) to complete the form. If you have an account, select "I already have a USGBC Web site account" and enter email and password (twice). If you do not have an account, you may select "Create a new USGBC website account" and follow the instructions. It is recommended that you create an account separately on the USGBC website before you start the form. IMPORTANT: USACE team members are members of USGBC and are eligible for Member prices. USACE team members registering projects should be sure to include the USACE Corporate Access ID on the form (if you do not have it contact [richard.l.schneider@usace.army.mil](mailto:richard.l.schneider@usace.army.mil) or [judith.f.milton@usace.army.mil](mailto:judith.f.milton@usace.army.mil) for the number).
2. The Account/Login Information section is filled out by the person registering the project. It may be a contractor or a USACE staff member.

##### **PROJECT TYPE SECTION**

Self-explanatory. As of October 08 USACE projects use LEED for New Construction V2.2. USACE staff members are USGBC members.

##### **GENERAL PROJECT INFORMATION SECTION**

**Project Title:** Match the project name used in P2. Contact the USACE Project Manager for this information.

**Is Project Confidential:** Indicate NO except if project has security sensitivity (elements that are FOUO or higher security) indicate YES.

**Project Address 1 and 2:** This is the physical location of the project. Provide building number, street address, block number or whatever is known to best describe the location of the project on the Installation.

**Project City:** Installation Name

**State, Country, Zip Code:** Self-explanatory

**How Did You Hear About LEED:** USACE requirement

#### **PRIMARY CONTACT INFORMATION**

The Primary Contact may be a Contractor or a USACE staff member. USGBC considers this individual the primary point of contact for all aspects of the project. It is recommended this person be the Contractor Project Manager or the USACE Project Manager.

#### **PROJECT OWNER INFORMATION**

**Project Owner First Name, Last Name, email:** The Project Owner is the USACE Project Manager.

**Organization Name:** U.S. Army Corps of Engineers. This field **MUST** be completed this way because it will be used as a search field by higher HQ to find all USACE registered projects.

#### **PROJECT DETAILS**

**Owner Type:** Military Base

**Project Scope:** Provide brief description (example: barracks complex)

**Site Conditions:** Provide brief description (example: wooded with steep grades)

**Occupant Type:** Provide brief description (example: military and civilian employees)

**Owner Occupied:** No

**Gross Square Footage:** Provide total area all buildings in project

**Project Budget:** Do not include the cost for design, site work, demolition, abatement or other work – do not include Government contingency or supervision costs. For design-build and construction projects registered after award, use the awarded contract cost for construction of buildings only. For projects registered prior to award of design-build or construction contract, use the total Primary Facility cost from DD1391 or updated Primary Facility cost based on design development if available.

**Current Project Phase:** Identify phase at time of registration (example: design start, construction start)

**Project Type:** Self-explanatory

#### **PAYMENT INFORMATION**

Self-explanatory

**APPENDIX Q**  
**REV 2.1 – 30 SEP 2010**  
**AREA COMPUTATIONS**

**Computation of Areas:** Compute the “gross area” and “net area” of facilities (excluding family housing) in accordance with the following subparagraphs:

**(1) Enclosed Spaces:** The “gross area” is the sum of all floor spaces with an average clear height  $\geq 6'-11"$  (as measured to the underside of the structural system) and having perimeter walls which are  $\geq 4'-11"$ . The area is calculated by measuring to the exterior dimensions of surfaces and walls.

**(2) Half-Scope Spaces:** Areas of the following spaces shall count as one-half scope when calculating “gross area”:

- Balconies
- Porches
- Covered exterior loading platforms or facilities
- **Covered but not enclosed spaces, canopies, training, and assembly areas**
- Covered but not enclosed passageways and walks
- Open stairways (both covered and uncovered)
- Covered ramps
- Interior corridors (Unaccompanied Enlisted Personnel Housing Only)

**(3) Excluded Spaces:** The following spaces shall be excluded from the “gross area” calculation:

- Crawl spaces
- Uncovered exterior loading platforms or facilities
- Exterior insulation applied to existing buildings
- Open courtyards
- Open paved terraces
- Uncovered ramps
- Uncovered stoops
- Utility tunnels and raceways
- Roof overhangs and soffits measuring less than 3'-0" from the exterior face of the building to the fascia

**(4) Net Floor Area:** Where required, “net area” is calculated by measuring the inside clear dimensions from the finish surfaces of walls. If required, overall “assignable net area” is determined by subtracting the following spaces from the “gross area”:

- Basements not suited as office, special mechanical, or storage space
- Elevator shafts and machinery space
- Exterior walls
- Interior partitions
- Mechanical equipment and water supply equipment space
- Permanent corridors and hallways
- Stairs and stair towers
- Janitor closets
- Electrical equipment space
- Electronic/communications equipment space

## APPENDIX R

### RMS Submittal Register Input Form

RMS SUBMITTAL REGISTER INPUT FORM			CONTRACT NUMBER		DELIVERY ORDER																				
TITLE AND LOCATION																									
Button	<-----Right click for Instructions		TYPE OF SUBMITTAL								CLASSIFICATION				REVIEWING OFFICE										
SECTION	PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	01 - PRECON SUBMITTALS	02 - SHOP DRAWINGS	03 - PRODUCT DATA	04 - SAMPLES	05 - DESIGN DATA	06 - TEST REPORTS	07 - CERTIFICATES	08 - MFRS INSTRUCTIONS	09 - MFRS FIELD REPORT	10 - O&M DATA	11 - CLOSEOUT SUBMITTALS	FO - FOR INFORMATION ONLY	GA - GOVERNMENT APPROVED	DA - DESIGNER OF RECORD APPROVAL	CR - CONFORMANCE REVIEW	DA / CR	DA / GA	DO - DISTRICT OFFICE	AO - AREA OFFICE	RO - RESIDENT OFFICE	PO - PROJECT OFFICE	DR - DESIGNER OF RECORD	AE - ARCHITECT / ENGINEER
00 72 00	52.236-13	Accident Prevention Plan	X													X				X					
00 73 00	1.11	Dev. From Accept. Design. No Deviation from Contract					X											X		X				X	
00 73 00	1.11	Dev. From Accepted Design - Deviates from Contract					X											X		X				X	
00 73 00	1.17	Supplemental Price Breakdown	X											X						X					
00 73 00	1.18	SSHO Qualifications	X											X						X					
01 10 00	5.2.3.1	(if concrete pavement) Joint Layout Plan with design drawings					X									X									
01 10 00	5.5.2	Building Envelope Sealing Performance Testing						X						X						X					
01 10 10	***	Tests as Req by Codes - DOR Develops Test Program						X						X						X				X	
01 10 00	5.8.3	BAS Review Information		X													X		X	X				X	
01 10 00	5.8.3	BAS Performance Verification Test						X						X						X				X	
01 10 00	5.8.4	Testing Adjusting and Balancing						X						X						X				X	
01 10 00	5.8.5	Commissioning						X						X						X				X	
01 10 00	6.15	Environmental As Required for Site Specific					X									X				X				X	
01 10 00	6.16	Permits as required for Site specific					X									X				X				X	
01 10 00	5.10.2	Fire Protection Tests						X	X					X						X				X	
01 32 01.00 10	3.4.1	Preliminary Project Schedule	X												X					X					
01 32 01.00 10	3.4.2	Initial Project Schedule	X												X					X					
01 32 01.00 10	3.4.3	Design Package Schedule	X												X					X					
01 32 01.00 10	3.6.1	Periodic schedule updates from the Contractor	X												X					X					
01 32 01.00 10	3.7	Time Extension Request (Schedule)	X												X					X					
01 33 00	1.8	Submittal Register - DOR Input Required	X												X					X				X	
01 33 00	1.8	Submittal Register Updates (Design Packages, etc.)	X												X					X				X	
01 33 00	1.3.1	Substitution of Manuf or Model Named in Proposal		X	X												X			X				X	
01 33 16	1.2	Identify Designer(s) of Record	X												X					X					
01 33 16	1.1.2 / 3.2.4	Fast Track Design Package(s)					X									X			X	X					
01 33 16	1.2	Identification of all Designers of Record	X													X				X					
01 33 16	3.2.1	Site and Utility Des Package, incl. Substantiation					X									X			X	X					
01 33 16	3.2.2/3.5	Interim Des Subm Package(s), incl. Substantiation					X									X			X	X					
01 33 16	3.5.1	Drawings					X									X			X	X					
01 33 16	3.5.2.2	Sitework Design Analyses					X									X			X	X					
01 33 16	3.5.2.3	Structural Design Analyses					X									X			X	X					
01 33 16	3.5.2.4	Security Design Analyses					X									X			X	X					
01 33 16	3.5.2.5	Architectural Design Analyses					X									X			X	X					
01 33 16	3.5.2.6	Mechanical Design Analyses					X									X			X	X					
01 33 16	3.5.2.7	Life Safety Design Analyses					X									X			X	X					
01 33 16	3.5.2.8	Plumbing Design Analyses					X									X			X	X					
01 33 16	3.5.2.9	Elevator Design Analyses (as Applicable)					X									X			X	X					
01 33 16	3.5.2.10	Electrical Design Analyses					X									X			X	X					
01 33 16	3.5.2.11	Telecommunications Design Analyses					X									X			X	X					
01 33 16	3.5.2.12	Cathodic Protection Design Analyses					X									X			X	X					
01 33 16	3.5.3	Geotechnical Investigations and Reports					X									X			X	X					
01 33 16	3.5.4	LEED Submittals					X									X			X	X					
01 33 16	3.5.5	Energy Conservation Documentation					X									X			X	X					
01 33 16	3.5.6	Specifications					X									X			X	X					
01 33 16	3.5.7	Building Rendering					X									X			X	X					
01 33 16	3.2.4/3.7	Final Des Submittal Package(s), incl. Substantiation					X									X			X	X					
01 33 16	3.7.5	DD Form 1354 (Transfer of Real Property)										X				X			X						
01 33 16	3.2.5/3.8	Design Complete Submittal Package(s)					X									X			X	X					
01 33 16	3.3.3	Design and Code Review Checklists					X									X			X	X					
01 33 16	A-2.0	SID - Interim and Final (as applicable)			X	X	X								X				X						
01 33 16	B-2.0	FFE (as Applicable)					X								X				X						
01 45 04.00 10	3.2	Design and Construction QC Plan	X													X			X						
01 57 20.00 10	1.2	Environmental Protection Plan	X													X			X						
01 78 02.00 10	1.2.1	Final as-Built Drawings											X		X										
01 78 02.00 10	1.2.3.11	Non-Hazardous Solid Waste Diversion Reports											X		X					X					
01 78 02.00 10	1.2.7	Provide final as-built CADD and BIM Model files											X		X					X					
01 78 02.00 10	1.2.9	Provide scans of all other docs in Adobe.pdf format											X		X					X					
01 78 02.00 10	1.3.1	Equip-in-Place list of all installed equip and cost											X		X					X					
01 78 02.00 10	1.3.2	Data on equip not addressed in O&M manuals											X		X					X					
01 78 02.00 10	1.3.3	Final as-built specs - electronic files											X		X					X					
01 78 02.00 10	1.4.2.1	Warranty management plan - FAR 52.246-21											X		X					X					
01 78 02.00 10	1.4.2.1	Certificates of Warranty for extended warranty items											X		X					X					
01 78 02.00 10	1.4.2.1	Contractor's POCs for implementing warranty process											X		X					X					
01 78 02.00 10	1.4.2.1	List of each warranted equip, item, feature or system											X		X					X					
01 78 02.00 10	1.5	See also Section 01 10 00 par. 5.8.4 and 5.8.5											X		X					X					
01 78 02.00 10	1.6.1.2	Equipment O&M Manuals - 1 electronic / 2 hard copies											X		X					X					
01 78 02.00 10	1.7	Field Training DVD Videos										X		X						X					
01 78 02.00 10	1.8	Pricing of CF/CI and GF/CI Property											X	X						X					
01 78 02.00 10	1.11	List of Completed Cleanup Items											X				X			X					

## Pretreatment of Termites on Fort Polk

### Pier Foundations

The termiticide of choice for pier foundations is Termador. Use of any other product must be approved by the Installation Pest Management Office.

The footings of each pier will be treated at label rate prior to the pier being installed. Additionally, the soil around the pier will be treated at label rate once back fill dirt is added and prior to completion of project.

### Slab Foundations

The termiticide of choice for pier foundations is Termador. Use of any other product must be approved by the Installation Pest Management Office.

All footings will be treated at label rate prior to the footing being poured. The ground will be treated at label rate prior to rebar or plastic being installed. Additionally, the back fill soil will be treated at label rate, after back fill is complete and prior to completion of project.

### Additional Requirements

1. The Pest Control company performing the treatment must have a Louisiana Commercial Applicators License.
2. The Pest Control company is required to provide the Pest Management Office a photo ID and a copy of the Applicator's license.
3. All termiticides will be mixed onsite.
4. The Pest Control company will provide Pest Management with the following upon completion of each treatment.
  - a. Name of Termiticide
  - b. Lot Number of product
  - c. Total gallons applied
  - d. Total Pounds of Active Ingredients applied



## APPENDIX BB

### Utility Dig Permit



Building 3304  
 Fort Polk, La. 71459  
 Phone: 337-531-2967  
 Fax: 337-653-3508

### Fort Polk Utility Location & Dig Permit Request

Date	
Location	
What is being done	
POC Name/Company	
POC Number	

#### **Directions:**

1. **Contractor** will **MARK AREA** to be excavated in **WHITE**.
2. Louisiana Law requires you (**CONTRACTOR**) to contact Louisiana 1 Call, representing all private and public utility companies. Dial 1-800-272-3020 – seven days in advance and have digging location information available at time of call. Any company with utilities in the area will mark the respective utility **within 48 hours**.

Louisiana 1 Call Ticket Number: \_\_\_\_\_

3. For Telephone, Data Lines and Fiber Optic Line utility locations on Fort Polk:
  - **Contact DOIM/ATS Contractor (GSTek) at 531-4019, bldg 3604**
  - Request location services seven days prior to digging.
  - Contractors are responsible to maintain marks.

DOIM/ATS Ticket Number: \_\_\_\_\_

4. Sprint/ADSS 537-4711 or **208-2025**.

Sprint/ADSS Ticket Number: \_\_\_\_\_

5. Gas and Exterior Electric. When you have completed 1 thru 4 above, hand carry this form along with a sketch of the area to be excavated to the **Work Reception Office in Bldg. 3307**. DPW will initiate service orders to locate gas and exterior electric. When you have received these service orders bring this form along with sketches to **Bldg 3304**. After all dates and times have been met you may pick up the approved dig permit, and proceed to excavate.

- Ext. Electric      Service Order #: \_\_\_\_\_
- Natural Gas      Service Order #: \_\_\_\_\_
- Chilled Water      Service Order #: \_\_\_\_\_
- Hot Water      Service Order #: \_\_\_\_\_

6. Permit to dig on Fort Polk is approved on \_\_\_\_\_

Approved by PRIDE Public Works Dpt. \_\_\_\_\_

## APPENDIX CC

### Electrical Metering

# SHARK<sup>®</sup>200

## UPGRADABLE FULLY FEATURED POWER & ENERGY METER

Revenue Grade with Advanced I/O and Power Quality

**RECORD POWER QUALITY EVENTS**

**EXTENSIVE DATA-LOGGING**

**Shark<sup>®</sup> 200T Transducer Only**

**Shark<sup>®</sup> 200 Meter/Transducer**

www.electroind.com



### From Simple to Sophisticated

- Simple Multifunction Meter: V-Switch<sup>™</sup> 1
- Historical Data-logging: V-Switch<sup>™</sup> 2
- Advanced Power Quality Waveform Recorder: V-Switch<sup>™</sup> 5 or 6

### Industry Leading Performance

- Highly Accurate Metering Technology
- Expandable I/O with 100BaseT Ethernet
- V-Switch<sup>™</sup> Technology Upgrade
- Extensive Data Logging
- Power Quality Recording
- Up to 512 Samples/Cycle



HIGH PERFORMANCE WAVEFORM RECORDING

Basic Features Summary

- 0.2% Class Revenue Certifiable Energy and Demand Metering
- Meets ANSI C12.20 and IEC 687 (0.2% Class)
- Multifunction Measurement
- 3 Line .56" Inch LED display
- % of Load Bar for Analog Perception
- Standard RS485 (Modbus and DNP 3.0)
- IrDA Port for PDA Read
- Ultra-Compact
- Fits both ANSI and DIN Cutouts

Advanced Features Summary

- High Performance Waveform Recorder
- Up to 4 Megabytes Flash for Historical Data Logging & PQ Recording
- Extremely Configurable Field Upgradable I/O
- 100BaseT Ethernet
- V-Switch™ Technology



APPLICATIONS

- Utility Metering
  - Substations
  - Power Generation
  - Submetering
  - Power Quality Studies
  - Load Studies
- Commercial Metering
  - Industrial Metering
  - Campus Metering
  - Analog Meter Replacement
  - Disturbance Recording
  - Voltage Recording

ACCURACY AND UPGRADE SWITCHES

Electro Industries introduces a new standard in panel mounted power metering. The Shark® 200 metering system is an ultra- compact power metering device providing industry leading revenue metering functionality combined with advanced data-logging, power quality, communication and I/O traditionally found only in high performance and high cost systems. This product is designed to incorporate advanced features in a cost effective small package for large scale, low cost deployment within an electrical distribution system.

V-Switch™ Technology

The Shark® 200 meter is equipped with EIG's exclusive V-Switch™ technology. This technology allows users to upgrade and add features by using communication commands as needed, even after the meter is installed.

V-Switches Include the Following Features:

Feature	V1	V2	V3	V4	V5	V6
Multifunction Measurement with I/O Expansion	✓	✓	✓	✓	✓	✓
2 Megabytes Data-Logging		✓	✓	✓		
3 Megabytes Data-Logging					✓	
4 Megabytes Data-Logging						✓
Harmonic Analysis			✓	✓	✓	✓
Limit and Control Functions				✓	✓	✓
64 Sample per Cycle Waveform Recorder					✓	
512 Sample per Cycle Waveform Recorder						✓

ACCURACY

Measured Parameters	Accuracy %	Display Range
Voltage L-N	0.1%	0-9999 Scalable V or kV
Voltage L-L	0.2%	0-9999 V or kV Scalable
Current	0.1%	0-9999 Amps or kAmps
+/- Watts	0.2%	0-9999 Watts, kWatts, MWatts
+/-Wh	0.2%	5 to 8 Digits Programmable
+/-VARs	0.2%	0-9999 VARs, kVARs, MVARs
+/-VARh	0.2%	5 to 8 Digits Programmable
VA	0.2%	0-9999 VA, kVA, MVA
VAh	0.2%	5 to 8 Digits Programmable
PF	0.2%	+/- 0.5 to 1.0
Frequency	+/- 0.03 Hz	45 to 65 Hz
%THD	+/- 2.0%	1 to 99.99%
% Load Bar	+/- 1 Segment	(0.005 to 6) A

Note: Applies to 3 element WYE and 2 element Delta connections. See full accuracy specifications in Shark® 200 Meter User Manual. Neutral current 2% accuracy.

Tracable Watt-Hour Test Pulse for Accuracy Verification

The Shark® 200 is a traceable revenue meter. It contains a utility grade test pulse allowing power providers to verify and confirm that the meter is performing to its rated accuracy. This is an essential feature required of all billing grade meters.

- Utility Block and Rolling Average Demand
- Historical Load Profiling

EXTENSIVE DATA-LOGGING CAPABILITY (V2 and Higher)

The Shark®200 meter offers the capability of having 2 Megabytes of data-logging to be used for historical trends, limit alarms, I/O changes and sequence of events. The unit has a real-time clock that allows for time stamping of all the data in the instrument when log events are created.

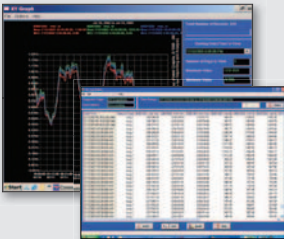
Historical Logs

- 3 Assignable Historical Logs
- Independently Program Trending Profiles
- Up to 64 Parameters per Log

System Events Log

To protection critical billing information, the meter records and logs the following with a time stamp:

- Demand Resets
- Password Requests
- System Startup
- Energy Resets
- Log Resets
- Log Reads
- Programmable Settings Changes



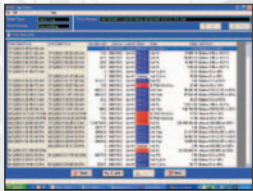
Historical Trending

I/O Change Log

- Provides a Time Stamped Log of any Relay Output
- Provides Time Stamped Log of Input Status Changes
- 2048 Events Available

Limit/Alarm Log

- Provides Magnitude and Duration of an Event
- Includes Time Stamps and Alarm Value
- 2048 Events Available

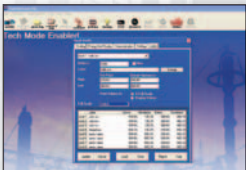


Alarm Log

Limits Alarms and Control Capability (V4 Option)

Limit Events

- Any measured parameter
- Up to 16 Limits
- Voltage Imbalance
- Current Imbalance
- Based on % of full scale settings



Limit Set Up

HIGH PERFORMANCE POWER QUALITY ANALYSIS (V5 AND V6)

Simultaneous Voltage and Current Waveform Recorder

The unit records up to 512 samples per cycle for a voltage sag or swell or a current fault event. The unit provides the following pre-event and post-event recording capability. Waveform records are programmable to the desired sampling rate. V5 provides up to 3 Megabytes storage and V6 provides a total of 4 Megabytes.

The meter's advanced DSP design allows Power Quality triggers to be based on a 1 cycle updated RMS. Up to 170 events can be stored until the memory fills. The meter stores waveform data in a first-in/first-out circular buffer to insure data is always recording.

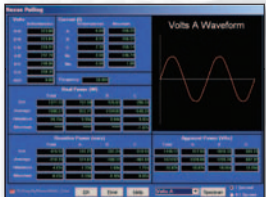
Optional Waveform Recorder

	Samples per Cycle	Pre Event Cycles	Post Event Cycles	Max Waveform per Event	Number of Stored
V5	16	32	96	256	85
	32	16	48	128	85
	64	8	24	64	85
V6	128	4	12	32	170
	256	2	6	16	170
	512	1	3	8	170

Note: Sampling rate based on 60Hz. 50Hz systems, divide sample rate by 0.83.

Waveform Scope

The unit uniquely offers a waveform scope to view the real time waveform for voltage and current. Waveform scope allows the meter to be used as a basic oscilloscope throughout a power system.



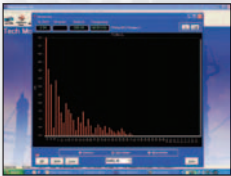
Waveform Scope Display

Independent CBEMA Log Plotting

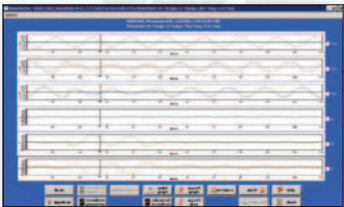
The meter stores an independent CBEMA log for magnitude and duration of voltage events. This allows a user to quickly view total surges, total sags and duration without retrieving waveform data.

Harmonic Recording to the 40th Order

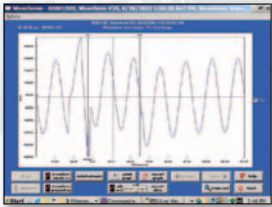
The Shark® 200 meter provides advanced harmonic analysis to the 40th order for each voltage and current channel in real time. Using the stored waveforms, harmonic analysis is available to the 255th order. The harmonics algorithm uses sophisticated active anti-aliasing filtering to provide true and accurate harmonics even when higher level harmonic conditions are present.



Harmonic Spectrum (40th Order)



6 Channels of Waveforms



Waveform Zoomed



## STANDARD COMMUNICATION CAPABILITY

The Shark® 200 meter provides two independent communication ports with advanced features.

### Rear Mounted Serial Port with KYZ Pulse

- RS485 - This port allows RS485 communication using Modbus or DNP3.0 Protocols. Baud rates are from 9600 to 57.6k.
- KYZ Pulse - In addition to the RS485, the meter also includes Pulse Outputs mapped to absolute energy.

### Front Mounted IrDA Communication

Uniquely, the Shark® meter also has an optical IrDA port, allowing the unit to be set up and programmed using a PDA or remote laptop without need for a communication cable. Just point at the meter with an IrDA-equipped PC or PDA and configure it. COPILOT EXT is a Windows CE software package that allows you configure the meter and poll readings.

## FIELD EXPANDABLE I/O AND COMMUNICATION CAPABILITIES

**The Shark® 200 meter offers unequalled I/O expandability.** Using the two universal option slots, the unit can easily be configured to accept new I/O cards even after installation. The unit auto-detects installed I/O option cards. Up to 2 cards of any type can be used per meter.

### 1. INP100S: 100BaseT Ethernet Capability –

The meter can provide 100BaseT Ethernet functionality. This advanced card is equipped with EIG's exclusive Total Web Solutions.

- WEBMOD - 12 Socket Modbus TCP
- WEBEXPLORER - Built-in web pages



### 2. 1mAOS: Four Channel Bi-directional 0-1mA Outputs

- Assignable to any parameter
- 0.1% of full scale
- 0 to 10K Ohms, no accuracy losses
- Range +/- 1.20mA



### 3. 20mAOS: Four Channel 4-20mA Outputs

- Assignable to any parameter
- 0.1% of full scale
- 0 – 500 Ohms, no accuracy losses
- Loop Powered using up to 24 Volts DC



### 4. RO1S: Two Relay Outputs / Two Status Inputs

- 250VAC/30VDC - 5A Relays, Form C
- Trigger on user set alarms
- Set delays and reset delays
- Status Inputs – Wet / Dry Auto Detect (Up to 150 VDC)
- Must be used with V4 or higher V-Switch™ option for limit based alarms and control



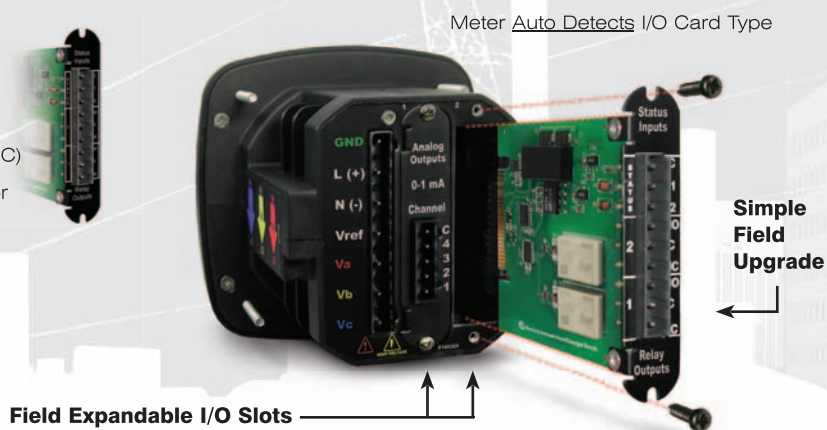
### 5. PO1S: Four Pulse Outputs / Four Status Inputs

- Programmable to any energy parameter and pulse value
- Form A: Normally open contacts
- Also used for End of Interval pulse
- Can function for manual relay control and limit based control (V4-V6 Options)
- 120mA continuous load current
- Status Inputs – Wet/Dry Auto Detect (Up to 150 VDC)



### 6. FOVPS or FOSTS: Fiber Optic Card

- EIG's exclusive Fiber Optic Daisy Chain switchable built in logic mimics RS485 half duplex bus allowing you to daisy chain meters for lower installation cost. Full duplex is also assignable.
- ST Terminated Option (-FOST)
- Versatile Link Terminated Option (-FOVP)
- Modbus and DNP 3.0 protocols available



**Note:** I/O cards can be ordered separately - see last page.

100 BASE T ETHERNET WITH TOTAL WEB SOLUTIONS ETHERNET (INP 100S)

Total Web Solutions—Advanced Metering Data Integration with the Web

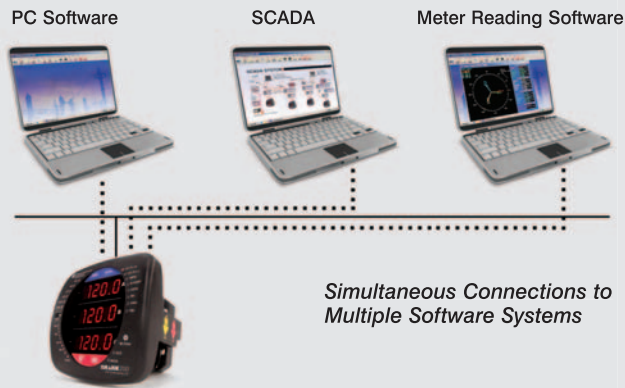
Total Web Solutions is an advanced Ethernet Communication Architecture that allows you to view metering data and host your meter power information web site directly on a Shark® meter. The meter directly hosts the web data without any need for dedicated server software, Active X Controls or Java Applets. The meter does the data collection, the formatting and the page hosting. Additionally, this solution is very Information Technology Dept. friendly because it causes almost no network traffic and provides all formatted data through an HTTP interface without using resident client software.

Advanced Features Include:

- 100BaseT Ethernet
- Direct Web Page Hosting With Live Readings
- Read Direct From Meters (No Server Software Needed)
- No Active Controls or Java Downloads
- Simultaneous 12 socket connection
- Modbus TCP
- Low Cost / High Functionality

**WEB MOD** is a 10/100BaseT design that allows the unit to speak with 12 simultaneous sockets of Modbus TCP. Once the card is placed inside the meter, up to 12 different software packages can request data from the meter concurrently.

Simultaneous Data Connections



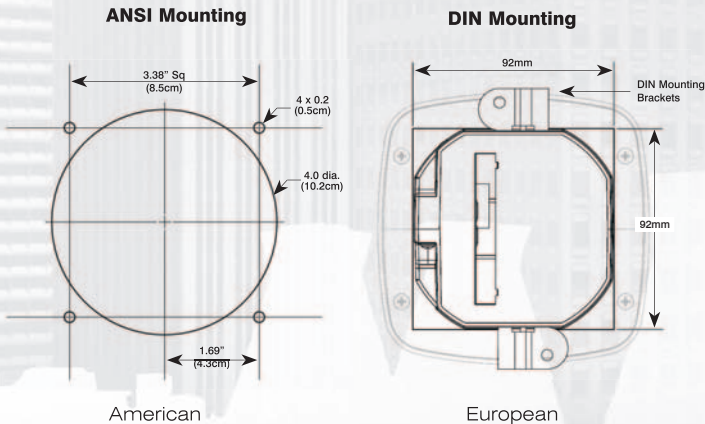
Simultaneous Connections to Multiple Software Systems

**WEB EXPLORER** provides you with direct access to all measured data through Internet Explorer without needing to download Active X Controls or Java Applets.



SHARK® 200 METER ANSI AND DIN MOUNTING

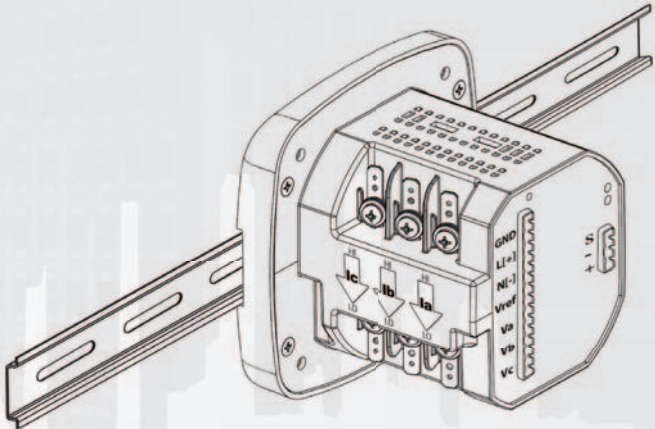
The unit mounts directly in an ANSI C39.1 (4" Round form) or an IEC 92 mm DIN square form. This is perfect for new installations and for existing panels. In new installations, simply use existing DIN or ANSI punches. For existing panels, pull out old analog meters and replace them with the Shark 200 meter. The meter uses standard voltage and current inputs so that CT and PT wiring does not need to be replaced.



(One meter fits both standards)

SHARK® 200T TRANSDUCER

This transducer version of the Shark® 200 meter which does not include a display. The unit mounts directly to a DIN rail and provides an RS485 Modbus or DN P 3.0 output and the expandable I/O.



Shark® 200T - DIN Rail Mounted Transducer

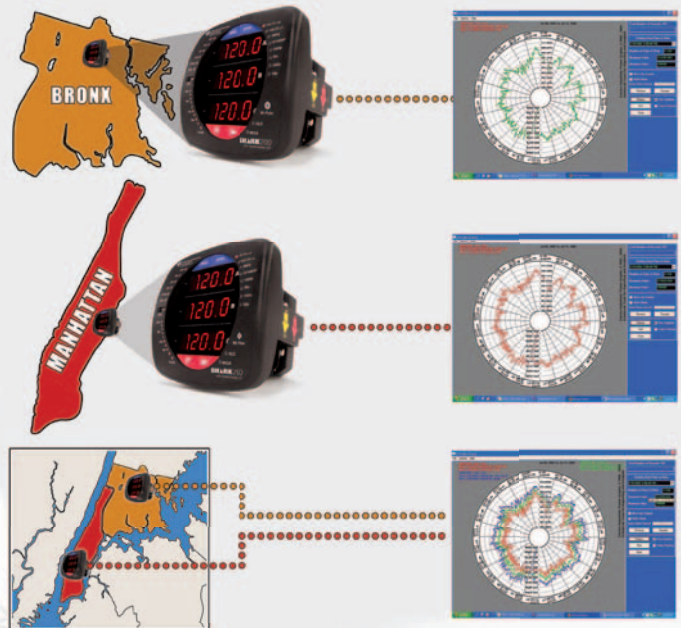


## Typical Substation Solutions

### SUBSTATION VOLTAGE RECORDING

Traditionally, voltage recording meters were relegated to high cost metering or monitoring solutions. The Shark® 200 meter can be placed throughout an electrical distribution network. The meter provides one of the industry's lowest cost methods of collecting voltage information within a Utility power distribution grid.

- Voltage reliability analysis insuring proper voltage to customers
- Compare voltage reliability throughout transmission or distribution networks
- Monitor the output of substation transformers or line regulators
- Initiate conservation voltage reduction, reducing system demand



### LOAD PROFILING

The Shark® 200 meter allows you to log substation data over time with regard to electrical usage, demand, voltage, current, PF and many other parameters. This enables a complete analysis of the power system over time.

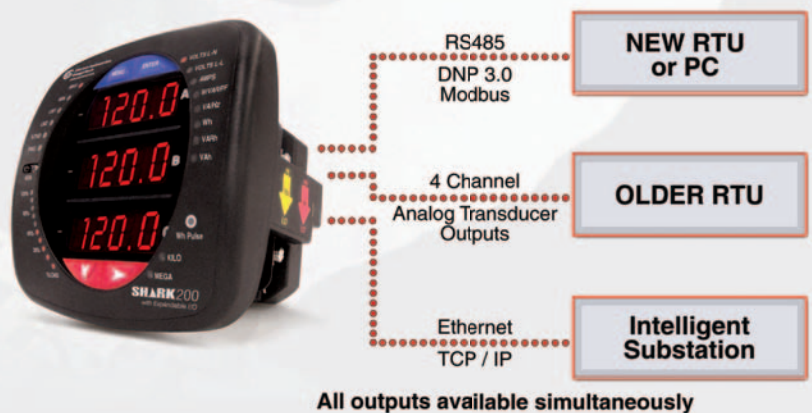
- Provide revenue accurate load profiling
- Determine substation usage
- Analyze feeder capacity and utilization
- Provide time based load profile for planning one estimation
- Data trend PF distribution and imbalances for system efficiency analysis



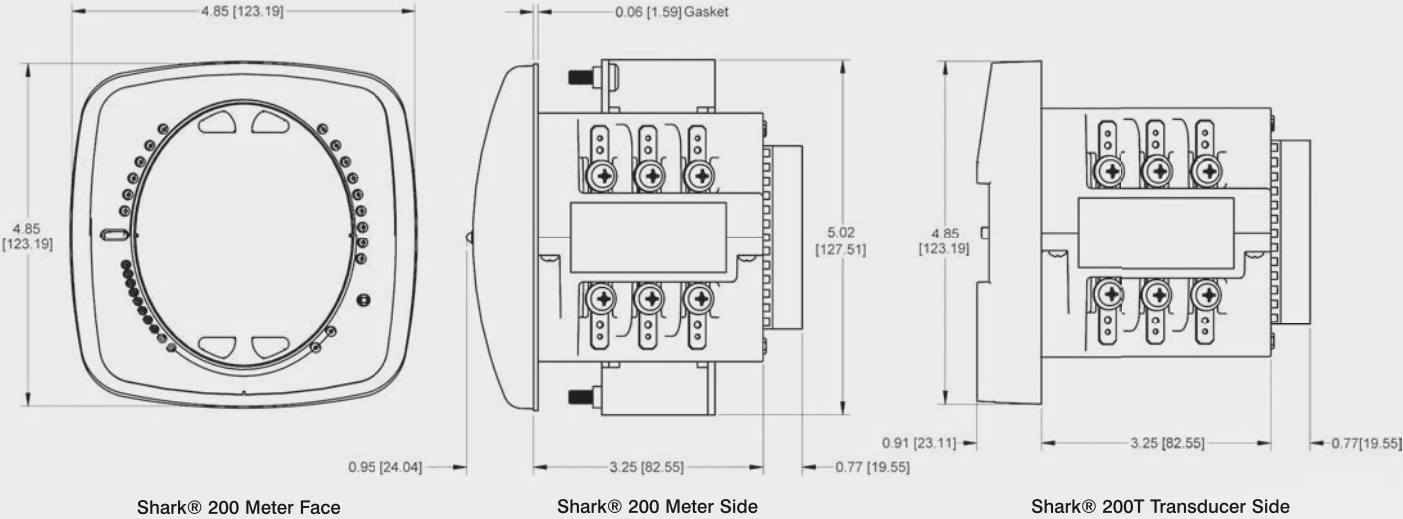
### LOW COST SUBSTATION TELEMETRY

The Shark® 200 meter's advanced output capability brings back data using many different communication mediums such as RS485, Ethernet and analog outputs. This insures that one meter can be used for almost every substation application no matter what communication infrastructure is needed.

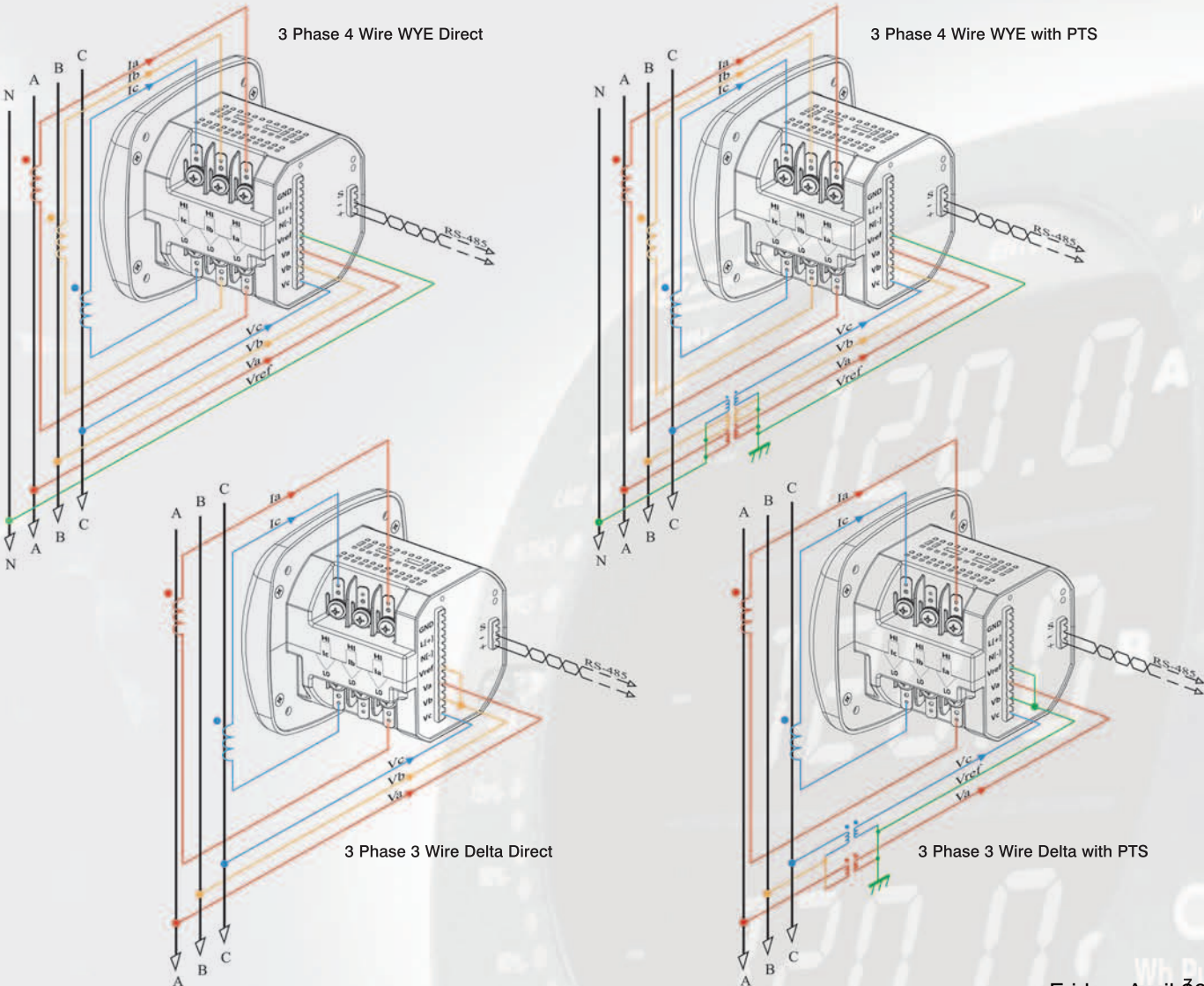
- Perfect for new or retrofit applications
- Multiple com paths
- One meter provides outputs for every application
- Multiple systems and/or user accessing data simultaneously



DIMENSIONAL DRAWINGS



WIRING DIAGRAMS





## Specifications

### Voltage Inputs

- 20-576 Volts Line To Neutral, 0-721 Volts Line to Line
- Universal Voltage Input
- Input Withstand Capability – Meets IEEE C37.90.1 (Surge Withstand Capability)
- Programmable Voltage Range to Any PT ratio
- Supports: 3 Element WYE, 2.5 Element WYE, 2 Element Delta, 4 Wire Delta Systems
- Burden: Input Impedance 1 Mega Ohms. Burden 0.014W at 120Volts
- Input wire gauge max (AWG 12 / 2.5mm<sup>2</sup>)

### Current Inputs

- Class 10: (0.005 to 11) A, 5 Amp Nominal
- Class 2: (0.001 to 2) A, 1A Nominal Secondary
- Fault Current Withstand: 100 Amps for 10 Seconds, 300 Amps for 3 Seconds, 500 Amps for 1 Second
- Continuous current withstand : 20 Amps for Screw Terminated or Pass Through Connections

- Programmable Current to Any CT Ratio
- Burden 0.005VA per phase Max at 11Amps
- Pickup Current: 0.1% of Nominal Class 10: 5mA Class 2: 1mA
- Pass through wire diameter: 0.177" / 4.5mm

### Isolation

All Inputs and Outputs are galvanically isolated to 2500 Volts

### Environmental Rating

Storage: (-20 to +70)° C  
Operating: (-20 to +70)° C  
Humidity: to 95% RH Non-Condensing  
Faceplate Rating:  
NEMA12  
(Water Resistant)  
Mounting Gasket Included

### Sensing Method

- True RMS
- Sampling at over 400 samples / cycle on all channels measured readings simultaneously
- Harmonics resolution to 40th order
- Waveform up to 512 samples/cycle

### Update Rate

- Watts, VAr and VA-100msec
- All other parameters-1second

### Power Supply

#### Option D2:

- (90 to 265) Volts AC and (100 to 370) Volts DC. Universal AC/DC Supply

#### Option: D:

- (18-60) Volts DC (24-48 VDC Systems)

Burden: 10VA Max

### Standard Communication Format

- 2 Com Ports (Back and Face Plate)
- RS485 Port (Through Back Plate)
- IrDA (Through Faceplate)
- Com Port Baud Rate: (9,600 - 57,600)
- Com Port Address: 1-247
- 8 Bit, No parity
- Modbus RTU, ASCII or DNP 3.0 Protocols

### KYZ Pulse

- Type Form C Contact
- On Resistance: 35 Ohms Max
- Peak Voltage: 350 VDC
- Continuous Load Current: 120 mA
- Peak Load Current: 350mA (10ms)
- Off State Leakage Current @ 350VDC: 1 uA

### Dimensions and Shipping

- Weight: 2 lbs
- Basic Unit: H4.85 x W4.85 x L4.65
- Shark® 200 meter mounts in 92mm DIN & ANSI C39.1 Round Cut-outs
- Shark® 200T Transducer DIN rail mounted
- 2-inch Din Rail Included
- Shipping Container Dimensions: 6" cube

### Meter Accuracy

- See page 3
- Note: Accuracy specs doubled for 2.5 Element connections (less accurate).

### Compliance:

- IEC 687 (0.2% Accuracy)
- ANSI C12.20 (0.2% Accuracy)
- ANSI (IEEE) C37.90.1 Surge Withstand
- ANSI C62.41 (Burst)
- IEC1000-4-2 – ESD
- IEC1000-4-3 – Radiated Immunity
- IEC 1000-4-4 – Fast Transient
- IEC 1000-4-5 – Surge Immunity

### Patents:

US 6,751,563 - Total Web Solutions  
US 7,155,350 - V-Switch™ Capability  
D525,893 - Mechanical Design  
Other Patents Pending

## Ordering Information

All fields must be filled in to create a valid part number.

	Model	Frequency	Current Input	V-Switch Pack	Power Supply	I/O Slot 1*	I/O Slot 2*
Option Numbers:	-	-	-	-	-	-	-
Example:	<b>Shark200</b>	-60	-10	-V2	-D2	-INP100S	-X

Shark200 (Meter/Transducer)	-50 50 Hz System	-10 10 Amp Secondary	-V1 Multifunction Meter Only	-D2 90-265V AC/DC	-X None	-X None
Shark200T (Transducer Only)	-60 60 Hz System	-2 2 Amp Secondary	-V2 Standard Data- Logging Memory	-D 18-60V DC	-RO1S 2 Relays / 2 Status	-RO1S 2 Relays / 2 Status

## Additional Accessories

### Communication Converters

9PINC – RS232 Cable

CAB6490 - USB to IrDA Adapter

Unicom 2500 - RS485 to RS232 Converter

Unicom 2500-F – RS485 to RS232 to Fiber Optic Converter

Modem Manager, Model #, MM1 – RS485 to RS232 Converter for Modem Communication

IrDA232 - IrDA to RS232 Adapter for Remote Read

### Compliance Documents

Certificate of Calibration, Part #: CCal – This provides Certificate of Calibration with NIST traceable Test Data.

### Current Transformer Kits

CT200K – 200/5 Ratio .94" Window 3 CTs

CT400K – 400/5 Ratio, 1.25" Window, 3 CTs

CT800K – 800/5 Ratio, 2.06" Window, 3 CTs

CT2000K – 2000/5 Ratio, 3.00" Window, 3 CTs

### CT Specifications:

Frequency: 50 to 400Hz; Insulation: 600 Volts, 10kV BIL  
Flexible Leads: UL 1015 105°C, CSA Approved, 24" Long, #16AWG

### Software Option Numbers

COMEXT3 – CommunicatorEXT 3.0 for Windows®

\* Consult factory application engineer for additional transformer ratios, types or window sizes.

-V3  
Power Quality Harmonics

-V4  
Limits & Control

-V5  
64 Samples/cycle  
Waveform Recording

-V6  
512 Samples/cycle  
Waveform Recording

-PO1S  
4 Pulses /  
4 Status

-1mAOS  
4 channel  
Analog Output  
0-1  
(bidirectional)

-20mAOS  
4 Channel  
Analog Output  
4-20mA

-FOSTS  
Fiber Optic  
Output ST  
Terminated

-FOVPS  
Fiber Optic  
Output VPIN  
Terminated

-INP100S  
100BaseT  
Ethernet

-PO1S  
4 Pulses /  
4 Status

-1mAOS  
4 channel  
Analog Output  
0-1  
(bidirectional)

-20mAOS  
4 Channel  
Analog Output  
4-20mA

-FOSTS  
Fiber Optic  
Output ST  
Terminated

-FOVPS  
Fiber Optic  
Output VPIN  
Terminated

-INP100S  
100BaseT  
Ethernet

\* I/O cards can be ordered separately using the above part numbers.



**Electro Industries/GaugeTech**

1800 Shames Drive • Westbury, NY 11590

1-877-EIMETER (1-877-346-3837) • E-Mail: sales@electroind.com

Tel: 516-334-0870 • Web Site: www.electroind.com • Fax: 516-338-4741

Friday, April 29, 2011

E 149702 102601 I

## APPENDIX DD

### Gas Metering

# Ultrasonic Sonix 880



**S**onix is nothing short of a transformation in gas metering. Unlike mechanical diaphragm meters, the Sonix digital design completely eliminates moving parts, relying instead on the proven technology of ultrasonics to measure gas flow. The digital design provides a host of additional advantages. It creates a platform for extensive diagnostic capabilities and highly accurate temperature correction. Its compact size drastically reduces installation and labor costs and space requirements. A true expression of the principle that "less is more," Sonix's compact size and simple, no-moving parts design offers unprecedented levels of accuracy, reliability, and performance available in no other gas meter, all backed by a full 15 year warranty – the best in the industry.

## Specifications

### General

Meter Type: Single path ultrasonic  
 Meter Model: Sonix 880 Imperial – Sonix 25 Metric  
 Connections: 30Lt, 45Lt, 60Lt., 1A spg., #2Spg., #3Spg., #4Spg., 1-1/2" FTP, 2" FTP  
 Connection Configuration: Top in / top out, 6" center  
 Mounting: Connections Up Preferred  
 MAOP: 20 psig  
 Temperature range: -30° to 130°F correction  
 Temperature range: -30° to 150°F ambient  
 Gas Application: Clean, dry natural gas insensitive to liquid, particulate, and freezing  
 Gases with specific gravity between 0.6 (Natural Gas) and 1 (air)  
 Filter/flow conditioning: None required

### Rangeability

Capacity: 880 cfh at  $\Delta P$  of 0.5" w.c.  
 22:1 ( $\pm 1\%$  from 40 – 880 CFH)  
 110:1 ( $\pm 2\%$  from 8 – 40 CFH)  
 Low flow cutoff: 0.21 CFH  
 Capacity: 1,625 cfh at  $\Delta P$  of 2.0" w.c.  
 40:1 ( $\pm 1\%$  from 40 – 1,625 CFH)  
 203:1 ( $\pm 2\%$  from 8 – 40 CFH)  
 Low flow cutoff: 0.21 CFH

### Physical

Display: 3/8" LCD  
 4, 5, or 6 digit capacity registration  
 3 digit alarm/high resolution index  
 Imperial/metric units  
 Case: 383 aluminum alloy  
 Dimensions: 10.25" x 9.5" x 6.8"  
 Weight: 12 lbs.



### Power

Voltage range: 2.5 – 3.7 vDC  
 Battery: single "D" cell lithium thionyl chloride  
 10 year Year battery life warranty  
 Battery: field replaceable  
 Flash memory for permanent information retention without power

### Communications

Optical reading port requires optical probe and SONIXCOM software  
 Pulse type: Form A  
 Pulse duration: 50ms  
 Pulse rate: user scaleable  
 1 cu ft/pulse or liter/pulse  
 10 cu ft/pulse or liter/pulse  
 100 cu ft/pulse or liter/pulse  
 1000 cu ft/pulse or liter/pulse  
 AMR type: any Form A pulse collector

### Features

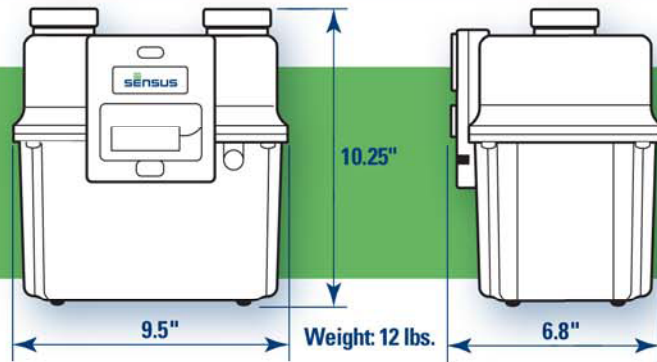
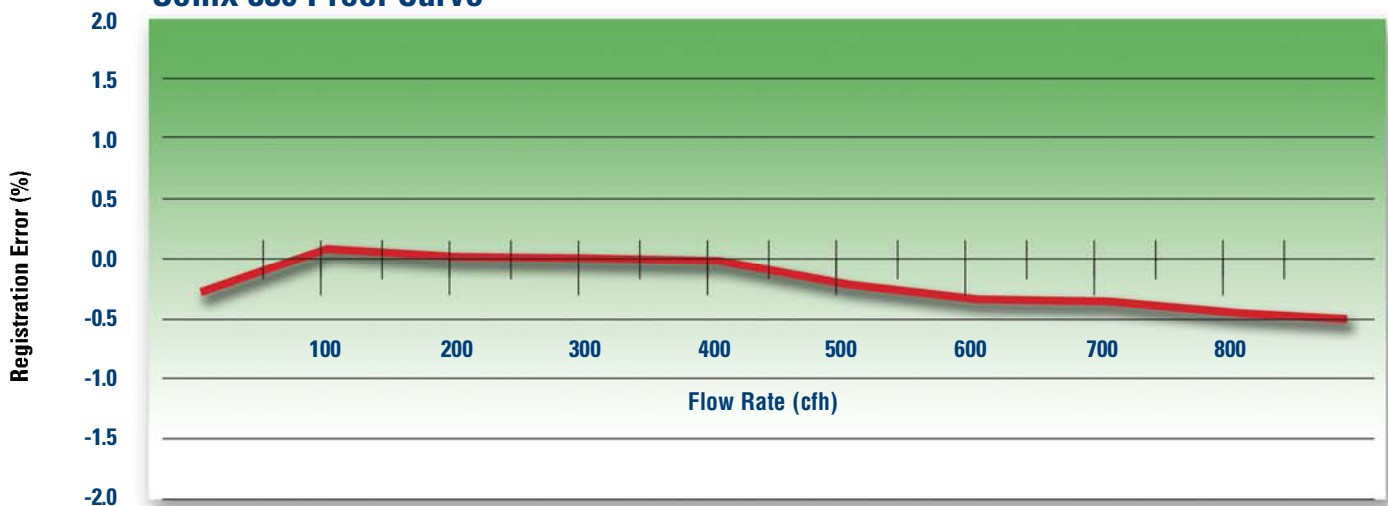
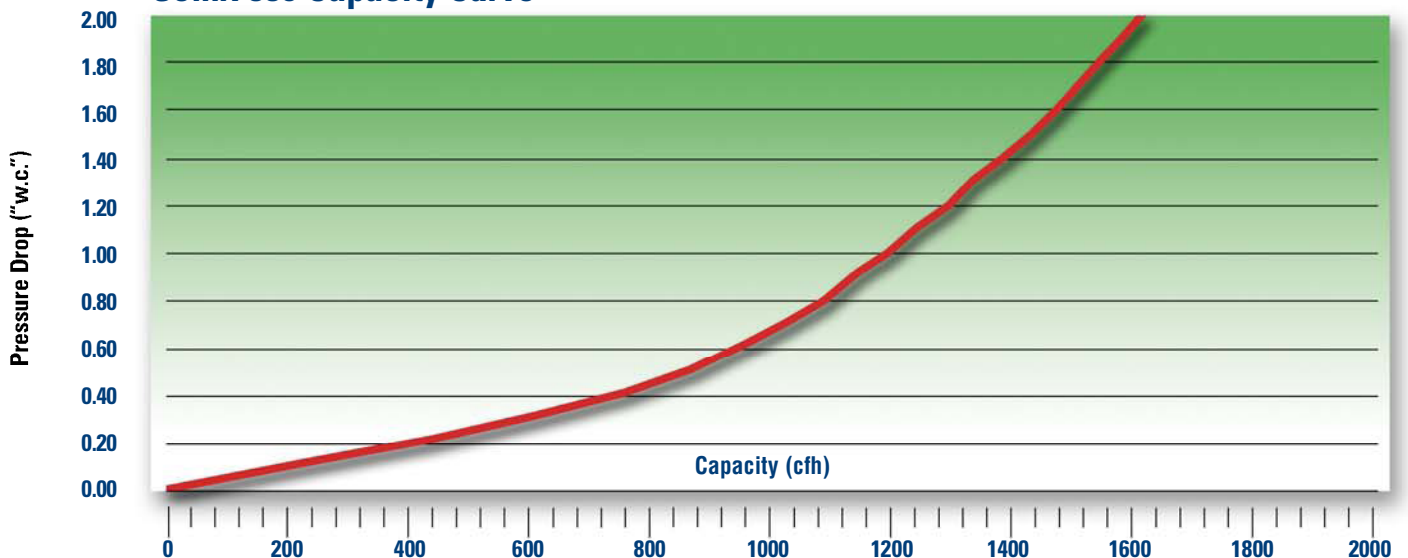
Warranty: 15-years meter  
 10-years battery  
 Diagnostics: anti-tamper alarms detect and log reverse flow and air in the meter  
 Temperature Compensation: Internal thermistor  
 Pressure Compensation: programmable Fixed Factor  
 Mechanical parts: None  
 Proof verification: compatible with sonic nozzle provers  
 Data logging: hourly for 60-days

### Regulatory Standards

Safety approvals: Certifications to CSA C22.2 No 213 Class 1 Division 2  
 Certification to ATEX II 1 G EEx ia IIB T4 Zone 0, Type i  
 Metrology Approvals:  
 Measurement Canada Approval AG-0514

# Ultrasonic Gas Meter

## Sonix 880

**SONIX**™

**Sonix 880 Proof Curve**

**Sonix 880 Capacity Curve**

**SENSUS**

805 Liberty Boulevard • DuBois, PA 15801  
 800-375-8875 • Fax: (814) 375-8460  
[www.sensus.com/gas](http://www.sensus.com/gas)

This product incorporates technology licensed from British Gas plc.

Friday, April 29, 2011

## APPENDIX EE

### Check Valves I

## For Health Hazard Applications

Job Name \_\_\_\_\_

Contractor \_\_\_\_\_

Job Location \_\_\_\_\_

Approval \_\_\_\_\_

Engineer \_\_\_\_\_

Contractor's P.O. No. \_\_\_\_\_

Approval \_\_\_\_\_

Representative \_\_\_\_\_

# Series 909

## Reduced Pressure Zone Assemblies

### Sizes: 2½" – 10" (65–250mm)

Series 909 Reduced Pressure Zone Assemblies are designed to provide cross-connection control protection of the potable water supply in accordance with national plumbing codes. This series can be utilized in a variety of installations, including health hazard cross-connections in plumbing systems or for containment at the service line entrance. With its exclusive patented relief valve design incorporating the "air-in/water-out" principle, it provides substantially improved relief valve discharge performance during the emergency conditions of combined backsiphonage and backpressure with both checks fouled.

### Features

- Replaceable bronze seats
- Stainless steel internal parts
- No special tools required for servicing
- Captured spring check assemblies
- Fused epoxy coated & lined checks
- Industrial strength sensing hose
- Field reversible relief valve
- Air-in/water-out relief valve design provides maximum capacity during emergency conditions

### Available Models

Suffix:

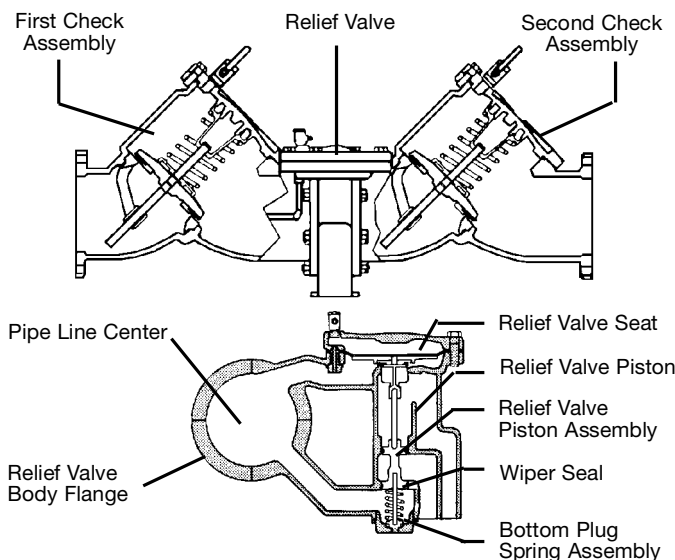
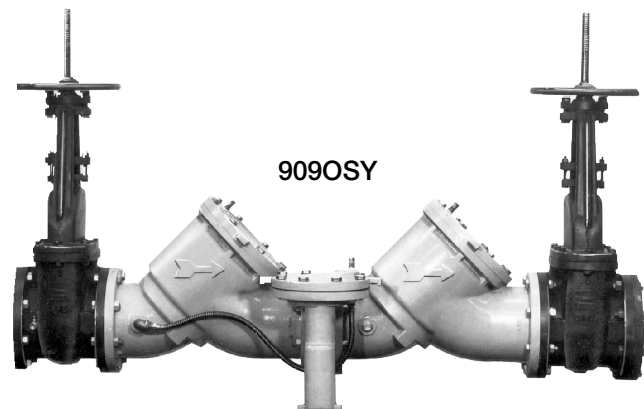
- BB – bronze body (2½", 3" only) (64, 76mm)  
 LF – without shutoff valves  
 NRS – non-rising stem resilient seated gate valves  
 OSY - UL/FM outside stem & yoke resilient seated gate valves  
 QT-FDA – FDA epoxy coated quarter-turn ball valves  
 S – cast iron strainer  
 S-FDA – FDA epoxy coated strainer

**Note:** The installation of a drain line is recommended. When installing a drain line, an air gap is necessary.

### Specifications

A Reduced Pressure Zone Assembly shall be installed at each cross-connection to prevent backsiphonage and backpressure backflow of hazardous materials into the potable water supply. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves and captured springs. Backsiphonage protection shall include provision to admit air directly into the reduced pressure zone via a separate channel from the water discharge channel. The assembly shall include two tightly closing shutoff valves before and after the valve and test cocks. The assembly shall meet the requirements of ASSE Std. 1013; AWWA Std. C511-92; CSA B64.5; and UL Classified File No. EX3185. Listed by IAPMO (UPC). Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. The assembly shall be a Watts Regulator Company Series 909.

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.



**Now Available**  
**WattsBox Insulated Enclosures.**  
 For more information, send for literature ES-WB.

**IMPORTANT: INQUIRE WITH GOVERNING AUTHORITIES  
 FOR LOCAL INSTALLATION REQUIREMENTS**

# WATTS®

Friday, April 29, 2011



Materials

Check Valve Bodies: FDA epoxy coated cast iron or bronze  
Seats: bronze  
Trim: stainless steel  
Relief Valve Body: 2½"-3" (60-80mm) bronze  
4"-10" (100-250mm) FDA epoxy coated cast iron  
Test Cocks: bronze body ball valve

Pressure — Temperature

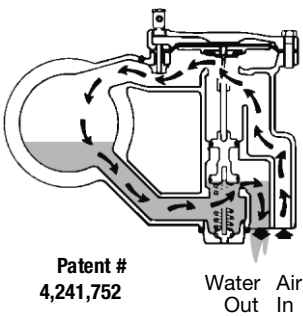
Temperature Range: 33°F-110°F (5°C-43°C) continuous,  
140°F (60°C) intermittent  
Maximum Working Pressure: 175psi (12.06 bar)

Standards

AWWA C511-92  
IAPMO PS 31, SBCCI (Standard Plumbing Code)  
USC manual for Cross-Connection Control, 8th Edition

How It Operates

The unique relief valve construction incorporates two channels: one for air, one for water. When the relief valve opens, as in the accompanying air-in/water-out diagram, the right-hand channel admits air to the top of the reduced pressure zone, relieving the zone vacuum. The channel on the left then drains the zone to atmosphere. Therefore, if both check valves foul, and simultaneous negative supply and positive backpressure develops, the relief valve uses the air-in/water-out principle to stop potential backflow.



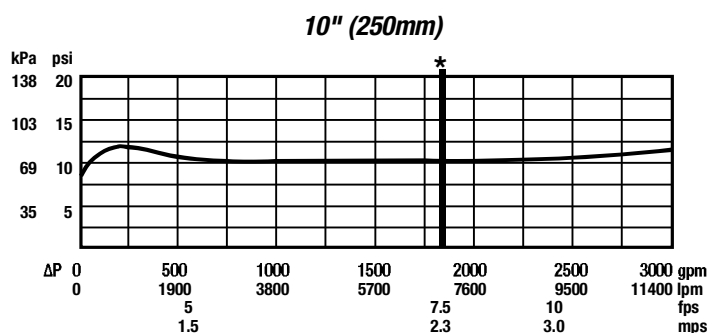
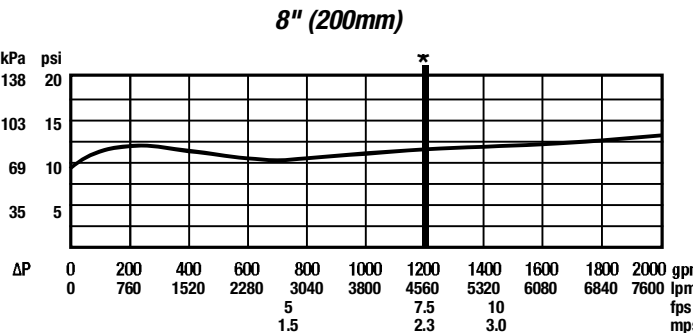
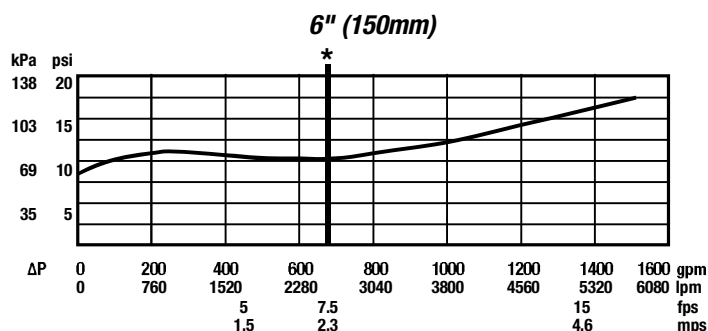
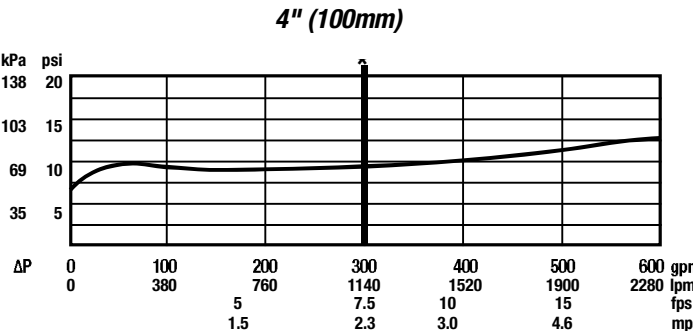
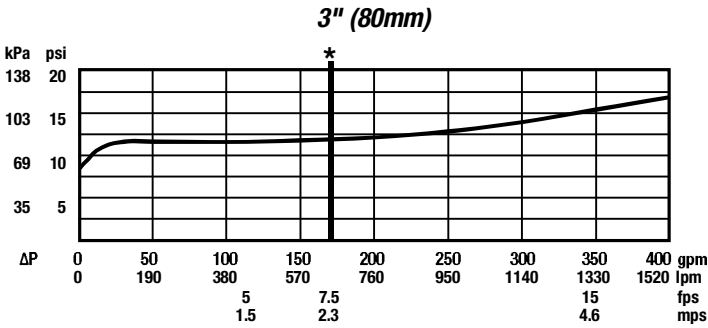
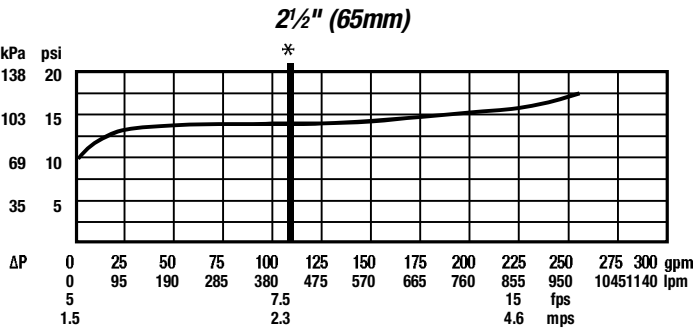
Approvals



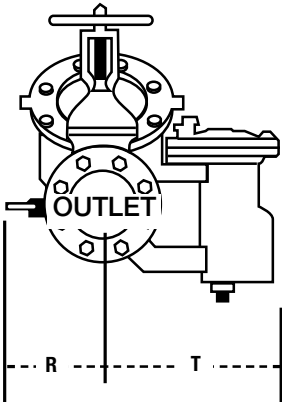
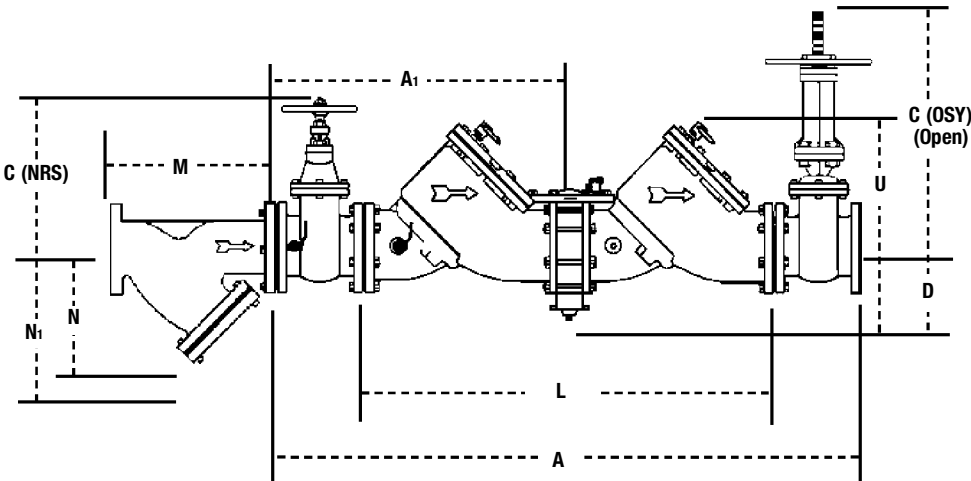
Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

Capacity

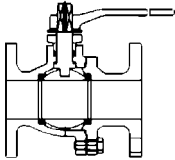
\*Typical maximum flow rate (7.5 feet/sec.)



Dimensions — Weights



Quarter-turn (QT) Valve



Watts G-4000 Series  
Ball Valves  
Send for F-G4000

NOTE: Valve may be furnished with (2) OSY or (2) NRS Shutoffs.  
NOTE: Relief valve section is reversible, therefore, can be on either side and is furnished standardly as shown.

SIZE (DN)				DIMENSIONS												WEIGHT											
				C								clearance for check U			R (QT)		T		NRS		OSY		QT				
A		A1		(OSY)*		(NRS)		D		L			R														
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kgs.	lbs.	kgs.	lbs.	kgs.				
2½	65	41¼	1048	20⅞	524	16⅜	416	9⅞	238	5¼	133	26⅞	663	11	279	4	102	16	406	9⅞	230	195	88.4	198	89.8	182	82.6
3	80	42¼	1073	21¼	540	18⅞	479	10¼	260	5¼	133	26⅞	663	11	279	5	127	16	406	9⅞	230	225	102	230	104	190	86
4	100	55⅞	1400	27⅞	702	22¾	578	12¾	310	6	152	37	940	14	356	6	152	19¾	502	14⅜	365	455	206	470	213	352	160
6	150	65½	1664	32¾	832	30⅞	765	16	406	6	152	44½	1130	16	406	11	279	26	660	14⅜	365	718	326	798	362	762	346
8	200	78½	2000	39⅞	1000	37¾	959	19⅝	506	9¾	248	55¼	1403	21	533	11¼	286	11¼	286	19¼	489	1350	612	1456	660	2286	1037
10	250	93⅝	2378	46⅞	1190	45¼	1162	23⅜	605	9¾	248	67⅞	1711	21	533	12½	318	12½	318	21	533	2160	980	2230	1011	3716	1685

\*UL, FM approved backflow preventers must include UL/FM approved OSY gate valves.

Strainer Dimensions

SIZE (DN)		DIMENSIONS				WEIGHT	
in.	mm	M		N1†		N	
		in.	mm	in.	mm	in.	mm
2½	65	10	254	10	254	6½	165
3	80	10⅞	257	10	254	7	178
4	100	12⅞	308	12	305	8¼	210
6	150	18½	470	20	508	13½	343
8	200	21⅞	549	22¾	578	15½	394
10	250	26	660	28	711	18½	470

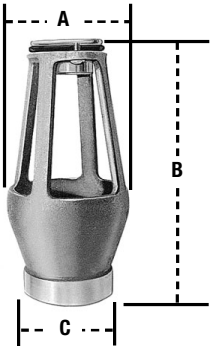
† – Dimension required for screen removal

Air Gap Dimensions

When installing a drain line on Series 909 backflow preventers that are installed horizontally, use 909 AG series air gaps.

			DIMENSIONS			WEIGHT	
Iron Body Model No.	Ordering Code	Series/Sizes	A in. mm	B in. mm	C in. mm	lbs	kgs
909AG-F	0881378	1¼" – 3" 009/909					
		1¼" – 2" 009 M1	4⅜ 111	6¾ 171	2 51	3.25	1.47
		2" 009 M2					
909AG-K	0881385	4" – 6" 909	6⅜ 162	9⅞ 244	3 76	6.25	2.83
909AG-M	0881387	8" – 10" 909 M1					
		8" – 10" 909	7⅞ 187	11¼ 286	4 102	15.50	7.03

For flange size backflow preventers installed vertically (flow down), a fabricated air gap is recommended.



For additional information, visit our website at: [www.watts.com](http://www.watts.com)



Backflow Prevention Products



ES-909L 0815

USA: 815 Chestnut St., No. Andover, MA 01845-6098; [www.watts.com](http://www.watts.com)  
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; [www.wattscanada.ca](http://www.wattscanada.ca)

© Watts Regulator Company, 2008  
Friday, April 29, 2011

## APPENDIX FF

### Check Valves II

## For Health Hazard Applications

Job Name \_\_\_\_\_

Contractor \_\_\_\_\_

Job Location \_\_\_\_\_

Approval \_\_\_\_\_

Engineer \_\_\_\_\_

Contractor's P.O. No. \_\_\_\_\_

Approval \_\_\_\_\_

Representative \_\_\_\_\_

# Series 994

## Reduced Pressure Zone Assemblies

**Sizes: 2½" – 10" (65 – 250mm)**

Series 994 Reduced Pressure Zone Assemblies are designed to provide protection of the potable water supply in accordance with national codes. This series can be used where approved by the local authority having jurisdiction on health hazard cross-connections. Series 994 features a short lay length, light-weight stainless steel body, corrosion resistant stainless steel relief valve, and patented torsion spring check valves.

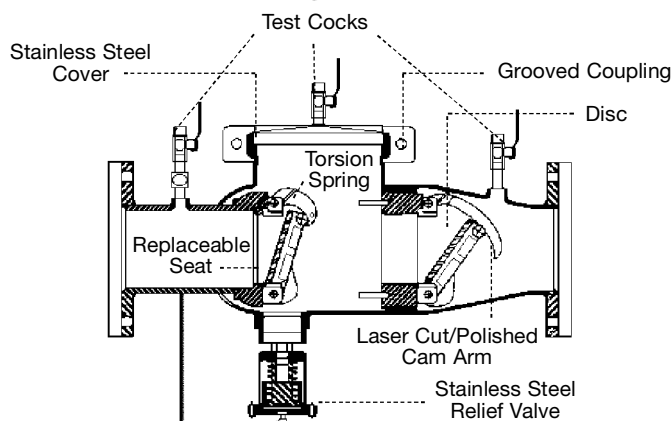
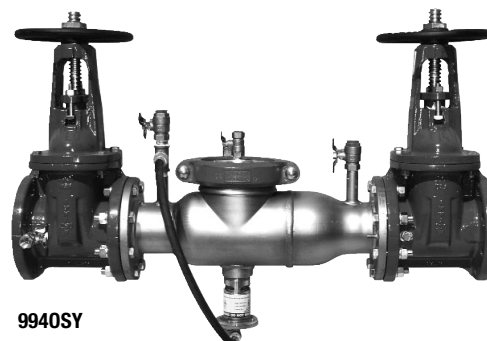
### Features

- Stainless steel construction provides long term corrosion resistance and maximum strength
- Stainless steel body is half the weight of competitive designs reducing installation & shipping costs
- Short end-to-end dimensions makes retrofit easy
- Bottom mounted relief valve reduces clearance requirements when installed against an outside wall
- Patented torsion spring check valves provides maximum flow at low pressure drop
- Thermoplastic & stainless steel check valves for trouble-free operation
- No special tools required for servicing
- Compact construction allows for smaller enclosures
- Stainless steel relief valve features a balanced rolling diaphragm to eliminate sliding seals and lower maintenance costs

### Specifications

A Reduced Pressure Zone Assembly shall be installed at each cross-connection to prevent backsiphonage and backpressure of hazardous materials into the potable water supply. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves. The main valve body shall be manufactured from 300 Series stainless steel for corrosion resistance. The check valves shall be of thermoplastic construction with stainless steel hinge pins, cam arm, and cam bearing. The check valve shall utilize a single torsion spring design to minimize pressure drop through the assembly. The check valves shall be modular and shall seal to the main valve body by the use of an O-ring. There shall be no brass or bronze parts used within the check assembly or relief valve. The use of seat screws to retain the check valve seat is prohibited. All internal parts shall be accessible through a single cover on the valve assembly securely held in place by a two-bolt grooved coupling. The differential relief valve shall be of stainless steel construction and shall utilize a rolling diaphragm and no sliding seals. The relief valve shall be bottom mounted and supplied with a steel reinforced sensing hose. The assembly shall include two resilient seated shutoff valves & four ball type test cocks. The assembly shall be a Watts Regulator Company Series 994.

**IMPORTANT: INQUIRE WITH GOVERNING AUTHORITIES  
FOR LOCAL INSTALLATION REQUIREMENTS**



### Models

#### Suffix:

NRS – non-rising stem resilient seated gate valves

OSY – UL/FM outside stem &amp; yoke resilient seated gate valves

\*OSY FxG – flanged inlet gate connection and grooved outlet gate connection

\*OSY GxF – grooved inlet gate connection and flanged outlet gate connection

\*OSY GxG – grooved inlet gate connection and grooved outlet gate connection

LF – without shutoff valves

S – cast iron strainer

Available with grooved NRS gate valves - consult factory\*

Post indicator plate and operating nut available - consult factory\*

\*Consult factory for dimensions

**Note:** The installation of a drain line is recommended. When installing a drain line, a 994AGK-P air gap is necessary. See ES-AG/EL/TC for additional information.

**Now Available**  
**WattsBox Insulated Enclosures.**

For more information, send for literature ES-WB.

**WATTS®**  
**REGULATOR**

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

Friday, April 29, 2011

## Materials

All internal metal parts: 300 Series stainless steel  
Main valve body: 300 Series stainless steel  
Check assembly: Noryl®  
Flange dimension in accordance with AWWA Class D

## Standards

AWWA C511-92, CSA B64.5, UL Classified

## Approvals



1013

B64.5

(OSY only) (2½" – 10", OSY only)

## Pressure – Temperature

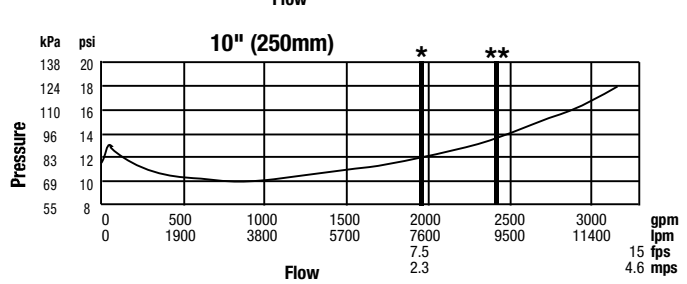
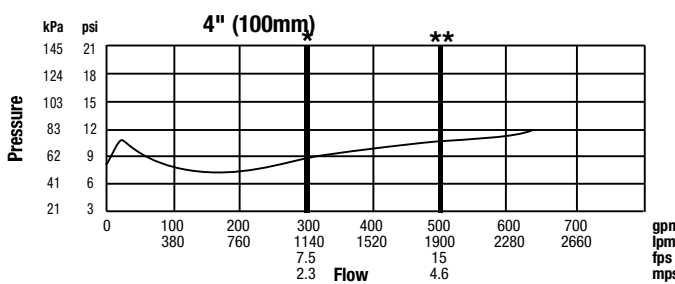
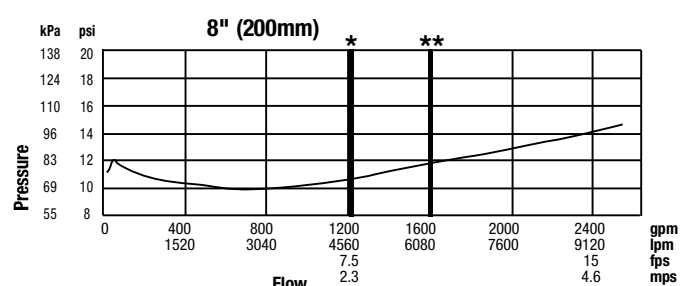
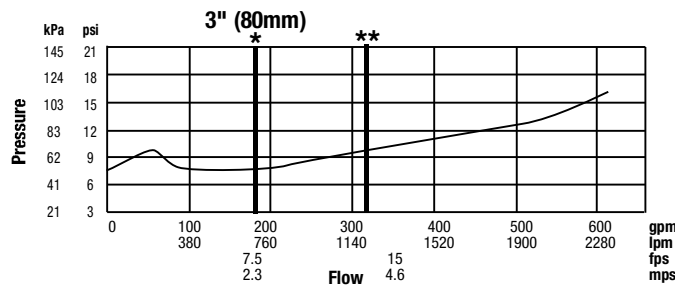
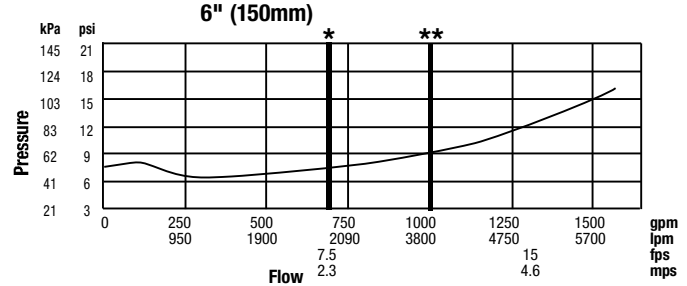
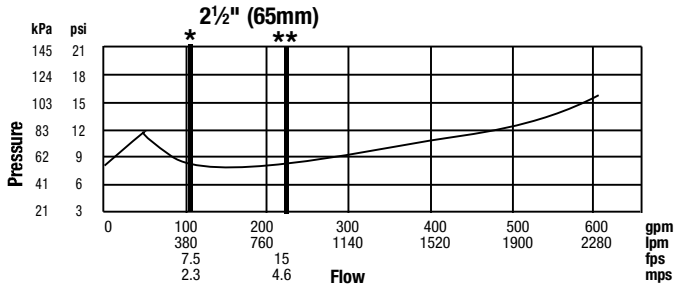
Temperature Range: 33°F – 110°F (5°C – 43°C) continuous  
Maximum Working Pressure: 175psi (12.06 bar)

Approved by the Foundation for Cross Connection Control & Hydraulic Research at the University of Southern California Sizes 2½" – 6" (65 – 250mm)

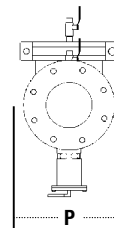
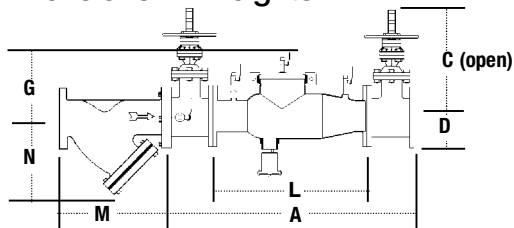
## Capacity

\*Typical maximum flow rate (7.5 feet/sec.) \*\*UL rated flow

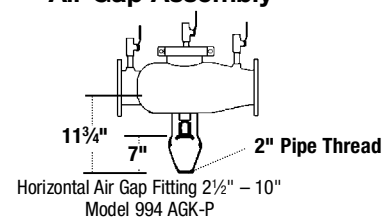
Series 994 performance as established by an independent testing laboratory (1996 UL)



## Dimensions – Weights



## Air Gap Assembly



SIZE (DN)				DIMENSIONS												WEIGHT							
		A		C (OSY)		C (NRS)		D		G		L		M		N		P		w/Gates		w/o Gates	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lb.	kg.	lb.	kg.
2½	65	37	940	16¾	416	9¾	238	10½	267	10	254	22	559	10	254	6½	165	7	178	148	67	60	27
3	80	38	965	18¾	479	10¼	260	10½	267	10	254	22	559	10⅞	257	7	178	7½	191	226	103	62	28
4	100	40	1016	22¾	578	12¾ <sub>16</sub>	310	10½	267	10	250	22	559	12¾	308	8¾	210	9	229	235	107	65	30
6	150	48½	1232	30⅞	765	16	406	11½	292	15	381	27½	699	18½	470	13¾	343	11	279	380	172	110	50
8	200	52½	1334	37¾	959	19½ <sub>16</sub>	506	12½	318	15	381	29½	749	21⅝	549	15½	394	13¾	343	571	259	179	81
10	250	55½	1410	45¾	1162	23¾ <sub>16</sub>	605	12½	318	15	381	29½	749	26	660	18½	470	16	406	773	351	189	86

Noryl® is a registered trademark of General Electric Company



USA: 815 Chestnut St., No. Andover, MA 01845-6098; [www.wattsreg.com](http://www.wattsreg.com)

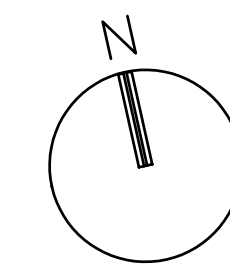
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; [www.wattscanada.ca](http://www.wattscanada.ca)

RFP W912HN-07-X-9316, Amendment No. 0002

APPENDIX GG  
TEMF Preliminary Grading Plan



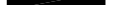
THIS DRAWING IS PRELIMINARY; NOT FOR PERMITTING OR CONSTRUCTION





## GRADING PLAN

SCALE: 1" = 40'

40' 20' 0 40'

A horizontal graphic scale bar with alternating black and white segments. Above the bar, the numbers 40', 20', 0, and 40' are marked, indicating distances in feet. The total length of the bar represents 80 feet.

LEGEND

- |   |   |     |                                  |
|---|---|-----|----------------------------------|
| ---   | 761   | --- | EXISTING CONTOUR (1 FT INTERVAL) |
| —   | 285   | —   | FINISHED 5' CONTOUR              |
| —   | 287   | —   | FINISHED 1' CONTOUR              |
|   | G   |     | GUTTER ELEVATION                 |
|   | T   |     | TOP OF SLAB                      |
|   | TC  |     | TOP OF CURB                      |
|   | TG  |     | TOP OF GRATE                     |
|   |  |     | DIRECTION OF FLOW                |
|  | <u>762.69</u>   |     | SPOT ELEVATION                   |
|   | FL  |     | FLOW LINE OF FLUME               |
|   | HP  |     | HIGH POINT                       |
|   | ME  |     | MATCH EXISTING                   |
|   | EX  |     | EXISTING SPOT ELEVATION          |
|   | 285.31  |     | SURVEYED SPOT ELEVATION          |
|   | 12"SD   |     | PROPOSED STORM DRAIN             |
|   | [1, C-501]  |     | DETAIL REFERENCE                 |


DETAIL NUMBER SHEET NUMBER

NOTES:

1. ALL GRADES AND CONTOURS SHOWN ARE FINAL, TOP OF FINISH SURFACE ELEVATIONS, UNLESS OTHERWISE NOTED.
2. POSITIVE DRAINAGE SHALL BE MAINTAINED ON ALL SURFACE AREAS WITHIN THE SCOPE OF THIS PROJECT. DRAINAGE SHALL BE DIRECTED AWAY FROM ALL BUILDING FOUNDATIONS. CONTRACTOR TO TAKE PRECAUTIONS NOT TO ALLOW ANY PONDING OF WATER.
3. CONTRACTOR TO OBTAIN GRADES SHOWN HEREON  $\pm$  FOUR-HUNDRETH (0.04) OF A FOOT.
4. ALL DISTURBED AREAS SHALL BE REVEGETATED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
5. ALL EARTHEN SLOPES SHALL BE A MAXIMUM OF 3:1 AND A MINIMUM OF 1.0% UNLESS OTHERWISE NOTED.
6. ALL MATERIALS AND CONSTRUCTION PROCEDURES WITHIN THE SCOPE OF THIS CONTRACT WHERE NOT SPECIFICALLY COVERED IN THE PROJECT SPECIFICATIONS SHALL CONFORM TO ALL APPLICABLE LOCAL CODES AND LOUISIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS (LATEST EDITION).
7. CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING TO ITS ORIGINAL, OR BETTER, CONDITION ANY DAMAGES DONE TO EXISTING BUILDINGS, UTILITIES, FENCES, PAVEMENT, CURBS, OR DRIVEWAYS.
8. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY QUESTIONS THAT MAY ARISE CONCERNING THE INTENT, PLACEMENT, OR LIMITS OF DIMENSIONS OR GRADES NECESSARY FOR CONSTRUCTION OF THIS PROJECT.
9. TREE PROTECTION SHALL BE PERFORMED, AS NEEDED.
10. THE PROPOSED GRADES ON THE CONCRETE HARDSTAND ARE A MINIMUM OF 1% AND A MAXIMUM OF 2%. THE POV PARKING SHALL BE A MINIMUM OF 1%. ALL ADA PARKING STALLS SHALL COMPLY WITH ADA MAXIMUM GRADES.
11. ALL EXCAVATION IS UNCLASSIFIED.
12. SITE AREAS REQUIRING FILL PLACEMENT SHALL BE SCARIFIED AND MOISTURE ADJUSTED TO WITHIN  $\pm$  3% OF OPTIMUM MOISTURE CONTENT. COMPACT SUBGRADE TO 95% MAXIMUM DRY DENSITY.
13. ALL STORM SEWER PIPE ON THIS PROJECT SHALL BE REINFORCED CONCRETE PIPE (RCP), UNLESS OTHERWISE SPECIFIED. MANNING "N" VALUES SHALL BE  $N=0.012$  UNLESS OTHERWISE NOTED.
14. STORM DRAINAGE, AS INDICATED, SHALL BE COLLECTED AND ROUTED TO DETENTION POND VIA SURFACE FLOW AND AN UNDERGROUND STORM DRAINAGE SYSTEM.

US ARMY CORPS  
OF ENGINEERS

[illegible]

 <b>CORGAN</b> ASSOCIATES, INC.	DESIGNED BY:	DATE:
	JOV	03/28/2011
	DRAWN BY:	SCALE:
	JOV	AS NOTED
	CHECKED BY:	DRAWING CODE:
	MBM	
	PROJECT #:	DATE:

<p> FORT POLK, LOUISIANA  TACTICAL EQUIPMENT MAINTENANCE FACILITY </p>	<p> SHEET TITLE : GRADING PLAN    CAI PROJECT : 10207.0000 </p>
--	---

SHEET  
IDENTIFICATION  
**CG-101**  
SHEET : X OF X

# MATKINHOOVER

**ENGINEERING  
& SURVEYING**



## APPENDIX JJ

### Site Work Documents

## Drawing Index

G-001	Project Location Plan
B-101	Boring Locations
B-201 – B-203	Logs of Boring
V-101 – V-104	Topographical Survey
C-101	Demolition Site Plan
C-102	Site Layout Plan
C-103	Paving Plan
C-104	Utility Site Plan
C-501	Paving Details
C-502	Utility Details
C-503	Drainage Details
C-504	Sanitary Sewer Details
C-505	Handicapped Parking Plan and Details
C-506	Dumpster Enclosure Plan and Details
C-507	Removable Pipe Bollards Details
C-508	Temporary Erosion Sediment and Water Pollution Control Measures
ES-101	Electrical Site Plan

UNIT OPERATIONS FACILITY FORT POLK, LOUISIANA



US ARMY CORPS  
OF ENGINEERS  
Ft. Worth District

# UNIT OPERATIONS FACILITY FORT POLK, LOUISIANA

LOCATION  
FORT POLK, LOUISIANA

SOLICITATION NO.  
DATED: MARCH 2011

K. M. NG & ASSOCIATES, INC.  
CONSULTING ENGINEERS  
SAN ANTONIO, TEXAS 78201  
TEXAS REGISTERED ENGINEERING FIRM F-442

CONTR. NO.

RFP SUBMITTAL

Friday, April 29, 2011

SOL. NO.

CONTR. NO.

SOL. NO.

FORT POLK, LA.





RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION

[illegible]

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS	Designed by: J. PICKERING	Date: MARCH 2011	Rev.
	Drawn by: J. PICKERING	Soil No.	
	Reviewed by: K. MCLESKEY	Cont. No.	
ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH	Submitted by: LESLIE J. PERRIN P.E.	File name: Pld date: MAR. 21, 2011	

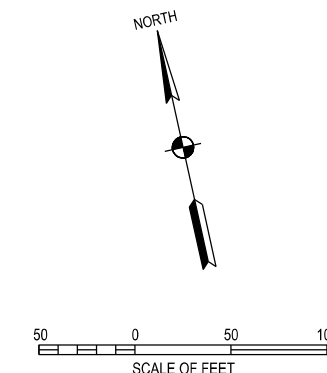
**FORT POLK, LOUISIANA**

**UNIT OPERATIONS FACILITIES**

**PROJECT NO. 069199**

**BORING LOCATIONS**

Sheet  
reference  
number:  
**B-101**  
ay, April 29, 20



LOG OF BORING NO. 10A2S-COF-11  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger

Location: See Figure 1

Drilling Log Data

DEPTH DRILLED: 11.5 ft  
DATE DRILLED: 5/19/2010  
DEPTH TO WATER: N/A  
DATE MEASURED: 5/19/2010  
PROJ. No.: AAA10-025-00  
FIGURE: 11

LOG OF BORING NO. 10A2S-COF-12  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger

Location: See Figure 1

Drilling Log Data

DEPTH DRILLED: 11.5 ft  
DATE DRILLED: 5/18/2010  
DEPTH TO WATER: N/A  
DATE MEASURED: 5/18/2010  
PROJ. No.: AAA10-025-00  
FIGURE: 12

LOG OF BORING NO. 8A2S-COF-13  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary

Location: See Figure 1

Drilling Log Data

DEPTH DRILLED: 61.5 ft  
DATE DRILLED: 5/20/2010  
DEPTH TO WATER: 13.0 ft  
DATE MEASURED: 5/20/2010  
PROJ. No.: AAA10-025-00  
FIGURE: 13a

LOG OF BORING NO. 8A2S-COF-13  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary

Location: See Figure 1

Drilling Log Data

DEPTH DRILLED: 61.5 ft  
DATE DRILLED: 5/20/2010  
DEPTH TO WATER: 13.0 ft  
DATE MEASURED: 5/20/2010  
PROJ. No.: AAA10-025-00  
FIGURE: 13b

LOG OF BORING NO. 8A2S-COF-13  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary

Location: See Figure 1

Drilling Log Data

DEPTH DRILLED: 61.5 ft  
DATE DRILLED: 5/20/2010  
DEPTH TO WATER: 13.0 ft  
DATE MEASURED: 5/20/2010  
PROJ. No.: AAA10-025-00  
FIGURE: 13c

LOG OF BORING NO. 8A2S-COF-13  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary

Location: See Figure 1

Drilling Log Data

DEPTH DRILLED: 61.5 ft  
DATE DRILLED: 5/20/2010  
DEPTH TO WATER: 13.0 ft  
DATE MEASURED: 5/20/2010  
PROJ. No.: AAA10-025-00  
FIGURE: 13d

LOG OF BORING NO. 8A2S-COF-14  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary

Location: See Figure 1

Drilling Log Data

DEPTH DRILLED: 62.0 ft  
DATE DRILLED: 5/18/2010  
DEPTH TO WATER: 23.0 ft  
DATE MEASURED: 5/18/2010  
PROJ. No.: AAA10-025-00  
FIGURE: 14a

LOG OF BORING NO. 8A2S-COF-14  
Unit Operations Facility  
Fort Polk RFP Support (KMN No. 101228.01)  
Leesville, Louisiana

Drilling Method: Straight Flight Auger & Mud Rotary

Location: See Figure 1

Drilling Log Data

DEPTH DRILLED: 62.0 ft  
DATE DRILLED: 5/18/2010  
DEPTH TO WATER: 23.0 ft  
DATE MEASURED: 5/18/2010  
PROJ. No.: AAA10-025-00  
FIGURE: 14b

US Army Corps of Engineers  
Fort Worth District

RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION

DESIGN FILE:  
U.S. ARMY ENGINEER DISTRICT,  
CORPS OF ENGINEERS  
FORT WORTH, TEXAS  
ENGINEERING/  
CONSTRUCTION DIVISION  
DESIGN BRANCH  
FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
PROJECT NO. 080199  
LOGS OF BORING 1 OF 3

Sheet  
reference  
number:  
B-201  
3 of 22

Friday, April 29, 2011

I:\Projects\Active\10\_Coe\1228.01\COF-1\psorb-201b1.dgn 3/21/2011

Pa 15 of 536		<div>US Army Corps of Engineers Fort Worth District</div> <div>RFP SUBMITTAL NOT FOR CONSTRUCTION</div> <div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
--------------	--	--

D

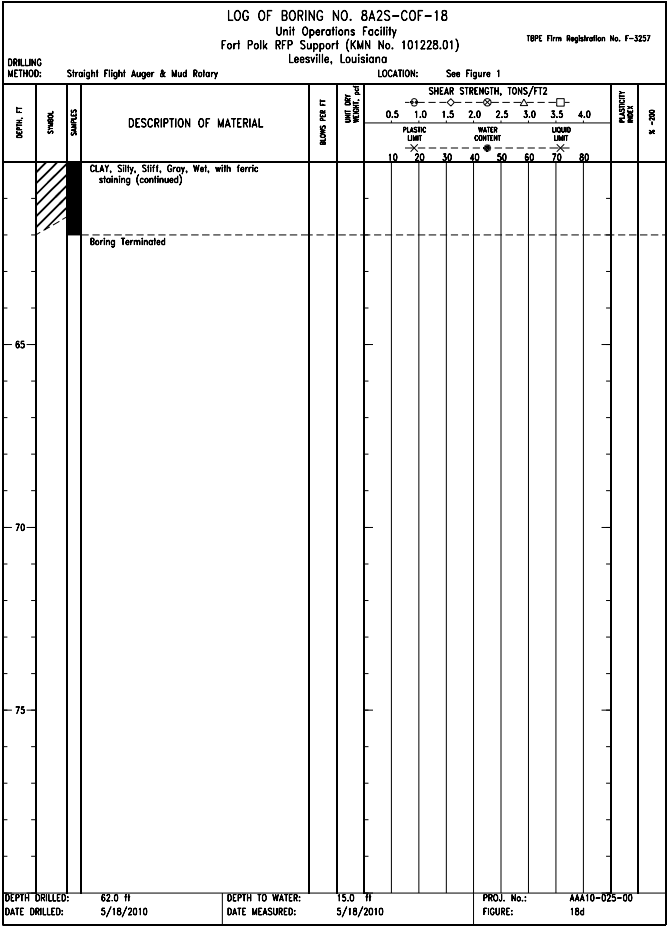
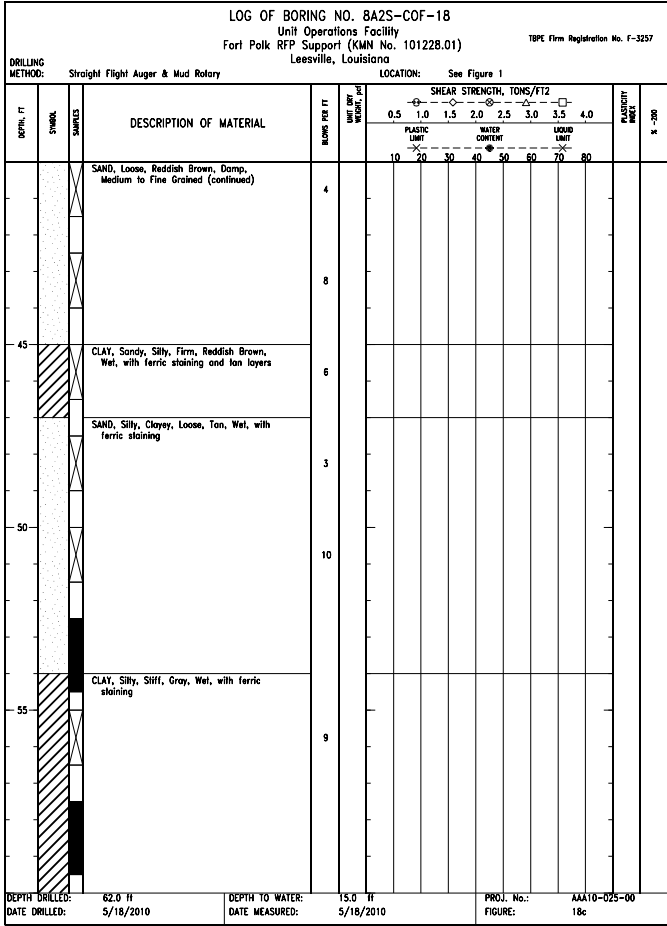
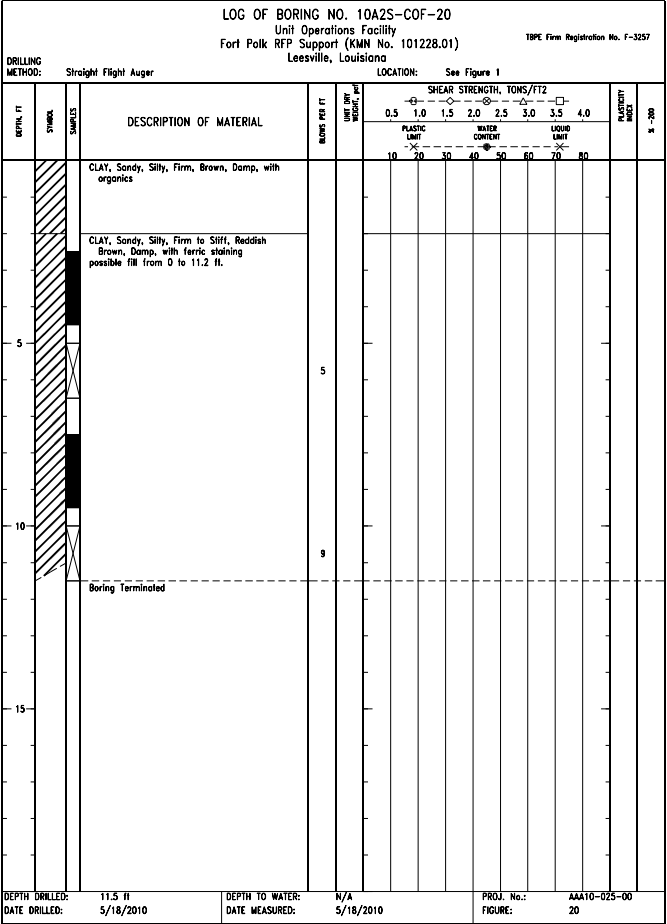
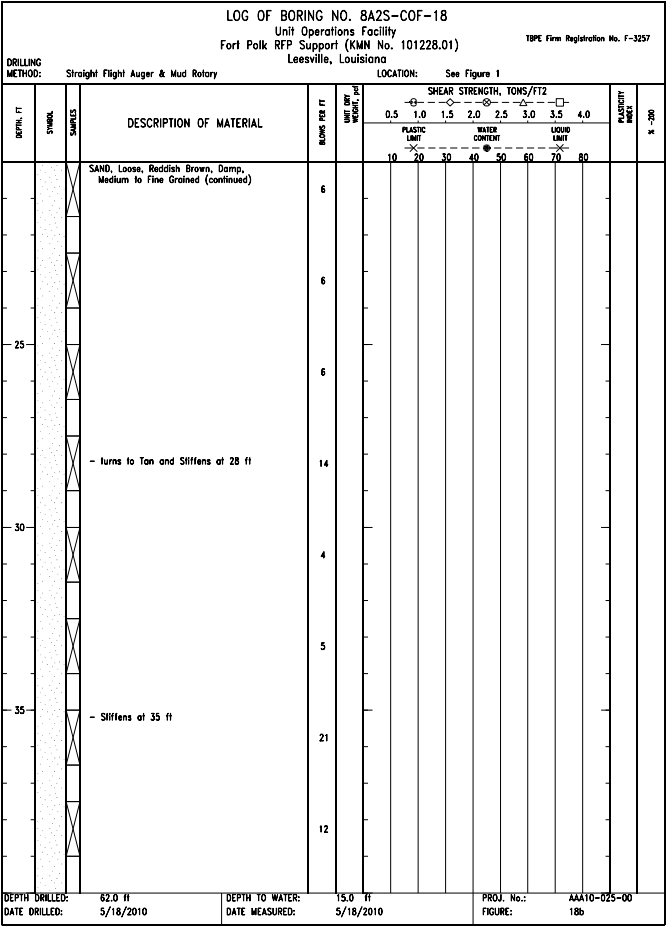
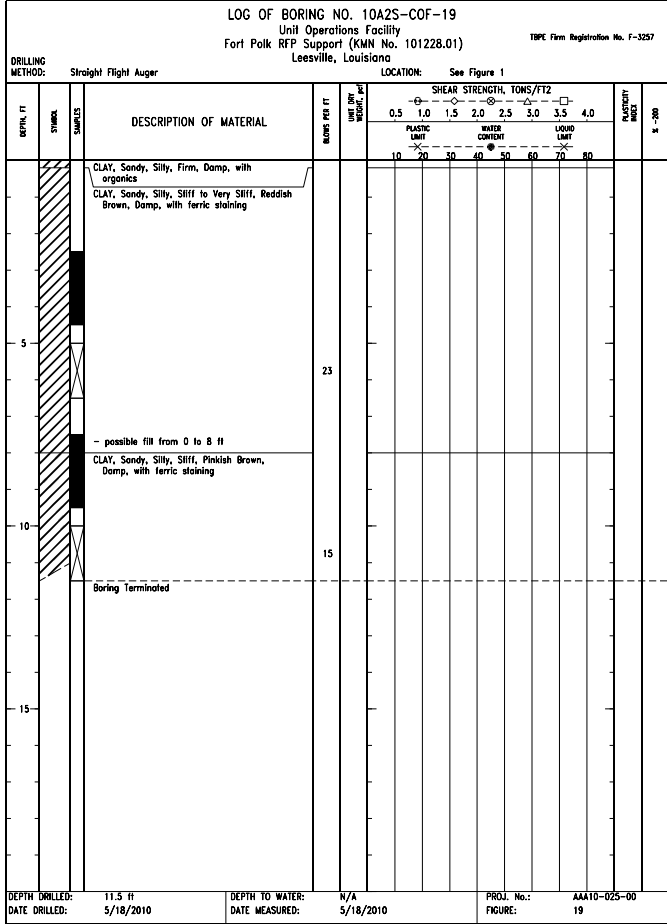
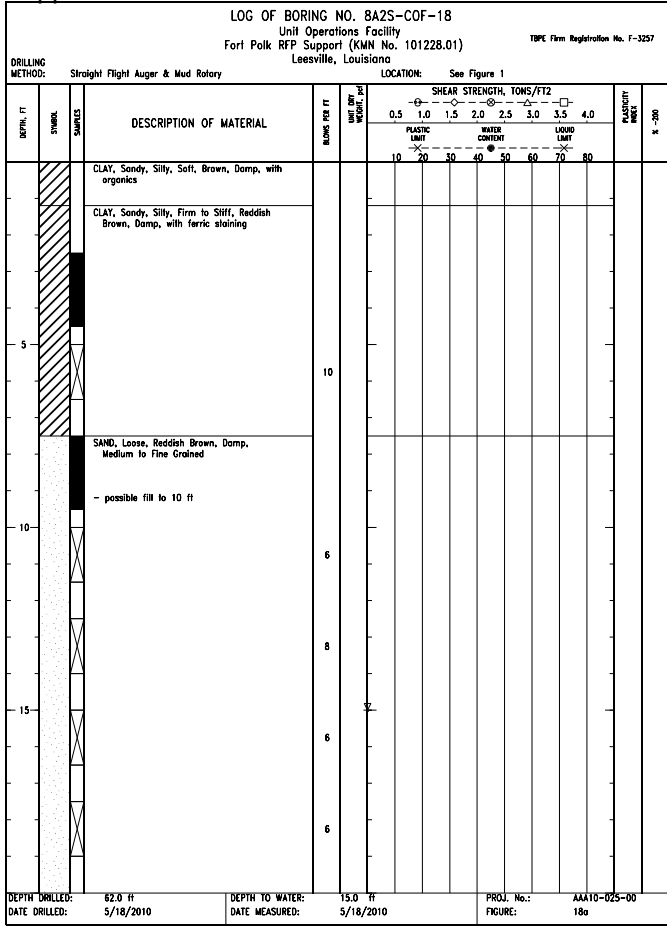
C

B

A

I:\Projects\Active\10\_Coe\1028.01\COF\1pcof-203b3.dgn

3/21/2011



- NOTES:
- USE THIS SHEET FOR BORING LOGS ONLY.
  - MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.
  - LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.
  - DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
  - ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

Page 176 of 536

US Army Corps of Engineers  
Fort Worth District

RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION

U.S. ARMY ENGINEER DISTRICT,  
CORPS OF ENGINEERS  
FORT WORTH, TEXAS

ENGINEERING/  
CONSTRUCTION DIVISION  
DESIGN BRANCH

FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
PROJECT NO. 080799

LOGS OF BORING 3 OF 3

Sheet  
reference  
number:  
B-203

Friday, April 29, 2011

DESIGN FILE:

Contr. No.





S Army Corps  
Engineers  
Fort Worth District

RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION

[illegible]

<b>K. M. NG &amp; ASSOCIATES, INC.</b> CONSULTING ENGINEERS <b>TEMS</b> REGISTERED ENGINEERING FIRM #42	Drawn by: R. RIOS Reviewed by: J. STANTON Conf. No.:		Date: 04/04/2011 File name:
	Dwn by: R. RIOS Reviewed by: J. STANTON Conf. No.:		Date: 04/04/2011 File name:
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS	Drawn by: R. RIOS Reviewed by: J. STANTON Conf. No.:		Date: 04/04/2011 File name:




































FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
PROJECT NO. 069199  
TOPOGRAPHICAL SURVEY  
SHEET 1 OF 4

Sheet  
reference  
number:  
**V-101**  
April 29, 2011  
Sheet 6 of 22

DESIGN FILE:

Contr. No.

LEGEND :

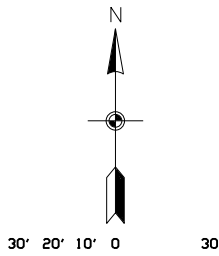
CENTER LINE _____		OVERHEAD SHIELD WIRE _____	OHS _____
POWER POLE _____		OVERHEAD ELECTRIC LINE _____	E <sub>x</sub> _____
POWER POLE/TRANS. _____		UNDERGROUND ELECTRIC LINE _____	E <sub>x</sub> <sup>u</sup> _____
LIGHT POLE _____		UNDERGROUND COMMUNICATION LINE _____	C <sub>x</sub> _____
LIGHT STANDARD _____		GAS MAIN LINE _____	G <sub>x</sub> _____
HELIPAD LIGHT _____		WATER MAIN LINE _____	W <sub>x</sub> _____
GUY WIRE _____		SANITARY SEWER MAIN LINE _____	SS <sub>x</sub> _____
ELECTRIC MANHOLE _____		STORM DRAIN MAIN LINE _____	SD <sub>x</sub> _____
COMMUNICATION MANHOLE _____		TOP OF POLE _____	TP _____
UTILITY BOX _____		LOW WIRE ELEVATION _____	LW _____
TRANSFORMER ON PAD _____		VALVE COVER _____	VC _____
TRAFFIC SIGNAL BOX _____		TOP OF VALVE _____	TV _____
ELECTRIC PULLBOX _____		BORE HOLE _____	
TRAFFIC SIGNAL CONTROLLER _____		WINDSOCK _____	
GAS VALVE _____		TRAFFIC SIGNAL ARM _____	
GAS METER _____		GEOGRAPHIC INFORMATION SYSTEM _____	(GIS)
SPRINKLER CONTROL VALVE _____		ABANDONED IN PLACE _____	(AIP)
GUARD POST _____			
BOLLARD _____			
WATER VALVE _____			
WATER METER _____			
FIRE HYDRANT _____			
SPRINKLER HEADS _____			
SAN. SEWER MANHOLE _____			
STORM DRAIN MANHOLE _____			
CLEAN-OUT _____			
TREE _____			
SHRUB _____			
SIGN _____			
HORIZ/VERT CONTROL POINT _____			
FENCE _____			
WATER FAUCET _____			
LINE LABEL ON OVERHEAD UTILITY _____	OH		
LINE LABEL ON UNDERGROUND UTILITY _____	UG		
UNDERGROUND ELECTRIC CONDUIT _____	UE		

SCALE: 1" = 30'-0"

NOTE:  
 COORDINATES ARE SURFACE BASED ON  
 NAD 83(93) LOUISIANA NORTH ZONE AND  
 NAVD 88 (US FT).  
 SURFACE COORDINATES = GRID COORDINATES x 0.99998

COORDINATES ARE BASED ON CONTROL  
 CP 100  
 N. 195436.68  
 E. 3060562.17

NOTE: UTILITIES SHOWN ARE BASED  
 ON ABOVE GROUND EVIDENCE AND

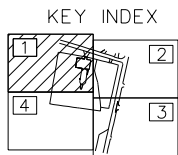


SCALE: 1" = 30' -0"

NOTE:  
COORDINATES ARE SURFACE BASED ON  
NAD 83(93) LOUISIANA NORTH ZONE AND  
NAVD 88 (US FT).  
SURFACE COORDINATES = GRID COORDINATES X 0.99998

COORDINATES ARE BASED ON CONTROL  
CP 100  
N. 195436.68  
E. 3060562.17

NOTE: UTILITIES SHOWN ARE BASED  
ON ABOVE GROUND EVIDENCE AND  
EXISTING UTILITY MAPS.  
UNDER GROUND LOCATIONS ARE  
APPROXIMATE.





US Army Corps  
of Engineers  
Fort Worth District

RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION

[illegible]

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS	Designed by: <b>R. RIOS</b>	Date: <b>MARCH 2011</b>	Rev.
	Dwn by: <b>R. RIOS</b>	Sof No.	
	Reviewed by: <b>J STANTON</b>	Contr No.	
<b>K. M. NG &amp; ASSOCIATES, INC.</b> <b>CONSULTING ENGINEERS</b> <b>REGISTERED PROFESSIONAL ENGINEERS</b> <b>TEMS-REGISTERED ENGINEERING FIRM #442</b>	Submitted by: <b>KUNG M. NG, PE</b> <b>COUNCILMEMBER</b>	File name: <b>CD - S:\Projects\2011\Mar_21_2011 Proj\gknt_20110321_AS SHOWN</b>	

FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
PROJECT NO. 069199  
TOPOGRAPHICAL SURVEY  
SHEET 2 OF 4

Sheet  
reference  
number:




































V-102  
April 29, 1954  
Sheet 7 of 7

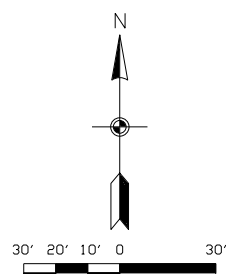
Friday

7, 4

22

LEGEND :

CENTER LINE _____		OVERHEAD SHIELD WIRE _____	OHS
POWER POLE _____		OVERHEAD ELECTRIC LINE _____	E <sub>x</sub>
POWER POLE/TRANS. _____		UNDERGROUND ELECTRIC LINE _____	E <sub>x</sub> <sup>u</sup>
LIGHT POLE _____		UNDERGROUND COMMUNICATION LINE _____	C <sub>x</sub> <sup>u</sup>
LIGHT STANDARD _____		GAS MAIN LINE _____	G <sub>x</sub>
HELIPAD LIGHT _____		WATER MAIN LINE _____	W <sub>x</sub>
GUY WIRE _____		SANITARY SEWER MAIN LINE _____	SS <sub>x</sub>
ELECTRIC MANHOLE _____		STORM DRAIN MAIN LINE _____	SD <sub>x</sub>
COMMUNICATION MANHOLE _____		TOP OF POLE _____	TP
UTILITY BOX _____		LOW WIRE ELEVATION _____	LW
TRANSFORMER ON PAD _____		VALVE COVER _____	VC
TRAFFIC SIGNAL BOX _____		TOP OF VALVE _____	TV
ELECTRIC PULLBOX _____		BORE HOLE _____	
TRAFFIC SIGNAL CONTROLLER _____		WINDSOCK _____	
GAS VALVE _____		TRAFFIC SIGNAL ARM _____	
GAS METER _____		GEOGRAPHIC INFORMATION SYSTEM	(GIS)
SPRINKLER CONTROL VALVE _____		ABANDONED IN PLACE	(AIP)
GUARD POST _____			
BOLLARD _____			
WATER VALVE _____			
WATER METER _____			
FIRE HYDRANT _____			
SPRINKLER HEADS _____			
SAN. SEWER MANHOLE _____			
STORM DRAIN MANHOLE _____			
CLEAN-OUT _____			
TREE _____			
SHRUB _____			
SIGN _____			
HORIZ/VERT CONTROL POINT _____			
FENCE _____			
WATER FAUCET _____			
LINE LABEL ON OVERHEAD UTILITY _____	OH		
LINE LABEL ON UNDERGROUND UTILITY _____	UG		
UNDERGROUND ELECTRIC CONDUIT _____	UE		

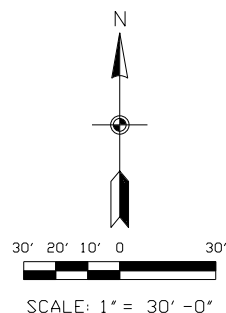


SCALE: 1" = 30' - 0"

NOTE:  
 COORDINATES ARE SURFACE BASED ON  
 NAD 83(93) LOUISIANA NORTH ZONE AND  
 NAVD 88 (US FT).  
 SURFACE COORDINATES = GRID COORDINATES X 0.99998

COORDINATES ARE BASED ON CONTROL  
 CP 100  
 N. 195436.68  
 E. 3060562.17

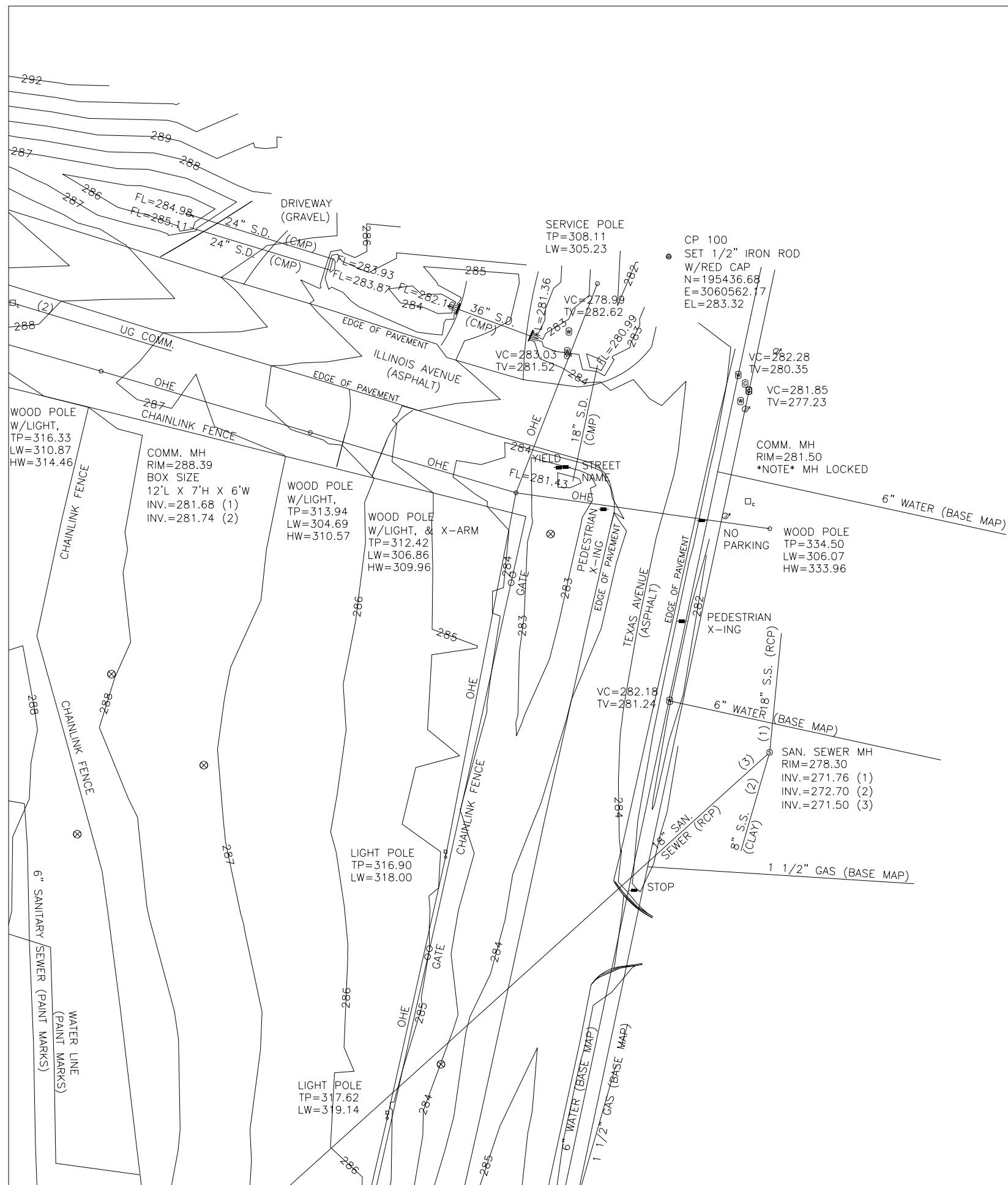
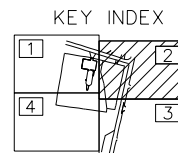
NOTE: UTILITIES SHOWN ARE BASED  
 ON ABOVE GROUND EVIDENCE AND



NOTE:  
COORDINATES ARE SURFACE BASED ON  
NAD 83(93) LOUISIANA NORTH ZONE AND  
NAVD 88 (US FT).  
SURFACE COORDINATES = GRID COORDINATES X 0.99998

COORDINATES ARE BASED ON CONTROL  
CP 100  
N. 195436.68  
E. 3060562.17

NOTE: UTILITIES SHOWN ARE BASED  
ON ABOVE GROUND EVIDENCE AND  
EXISTING UTILITY MAPS.  
UNDER GROUND LOCATIONS ARE  
APPROXIMATE.



et o of



US Army Corps  
of Engineers  
Fort Worth District

RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION

[illegible][illegible]






























FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
PROJECT NO. 069199  
TOPOGRAPHICAL SURVEY  
SHEET 4 OF 4

Sheet  
reference  
number:  
**V-104**  
April 29, 2011  
Sheet 9 of 22

DESIGN FILE:

Contr. No.

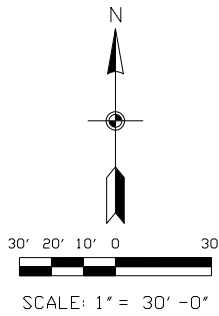
LEGEND :

CENTER LINE _____		OVERHEAD FIELD WIRE _____	OHS
POWER POLE _____		OVERHEAD ELECTRIC LINE _____	E <sub>x</sub>
POWER POLE/TRANS. _____	△xxxx	UNDERGROUND ELECTRIC LINE _____	E <sub>x</sub> <sup>u</sup>
LIGHT POLE _____		UNDERGROUND COMMUNICATION LINE _____	C <sub>x</sub> <sup>u</sup>
LIGHT STANDARD _____		GAS MAIN LINE _____	G <sub>x</sub>
HELIPAD LIGHT _____		WATER MAIN LINE _____	W <sub>x</sub>
GUY WIRE _____	→	SANITARY SEWER MAIN LINE _____	SS <sub>x</sub>
ELECTRIC MANHOLE _____		STORM DRAIN MAIN LINE _____	SD <sub>x</sub>
COMMUNICATION MANHOLE _____		TOP OF POLE _____	TP
UTILITY BOX _____	ⓐ <sup>x</sup>	LOW WIRE ELEVATION _____	LW
TRANSFORMER ON PAD _____	ⓐxxxx	VALVE COVER _____	VC
TRAFFIC SIGNAL BOX _____		TOP OF VALVE _____	TV
ELECTRIC PULLBOX _____		BORE HOLE _____	
TRAFFIC SIGNAL CONTROLLER _____		WINDSOCK _____	
GAS VALVE _____		TRAFFIC SIGNAL ARM _____	
GAS METER _____		GEOGRAPHIC INFORMATION SYSTEM	(GIS)
SPRINKLER CONTROL VALVE _____		ABANDONED IN PLACE	(AIP)
GUARD POST _____			
BOLLARD _____			
WATER VALVE _____			
WATER METER _____			
FIRE HYDRANT _____			
SPRINKLER HEADS _____	(○)		
SAN. SEWER MANHOLE _____			
STORM DRAIN MANHOLE _____			
CLEAN-OUT _____			
TREE _____			
SHRUB _____			
SIGN _____			
HORIZ/VERT CONTROL POINT _____			
FENCE _____	—X—X—		
WATER FAUCET _____			
LINE LABEL ON OVERHEAD UTILITY _____	OH		
LINE LABEL ON UNDERGROUND UTILITY _____	UG		
UNDERGROUND ELECTRIC CONDUIT _____	UE		

NOTE:  
 COORDINATES ARE SURFACE BASED ON  
 NAD 83(93) LOUISIANA NORTH ZONE AND  
 NAVD 88 (US FT).  
 SURFACE COORDINATES + GRID COORDINATES x 0.99998

COORDINATES ARE BASED ON CONTROL  
 CP 100  
 N. 195436.68  
 E. 3060562.17

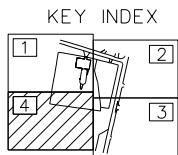
NOTE: UTILITIES SHOWN ARE BASED  
 ON ABOVE GROUND EVIDENCE AND



NOTE:  
COORDINATES ARE SURFACE BASED ON  
NAD 83(93) LOUISIANA NORTH ZONE AND  
NAVD 88 (US FT).  
SURFACE COORDINATES = GRID COORDINATES X 0.99998

COORDINATES ARE BASED ON CONTROL  
CP 100  
N. 195436.68  
E. 3060562.17

NOTE: UTILITIES SHOWN ARE BASED  
ON ABOVE GROUND EVIDENCE AND  
EXISTING UTILITY MAPS.  
UNDER GROUND LOCATIONS ARE  
APPROXIMATE.



**CDS/MUERY SERVICES**  
Engineering & Surveying  
3411 MAGIC DR. SAN ANTONIO, TEXAS 78229 210-581-1111



S Army Corps  
Engineers  
rt Worth District

RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION



01 - PHOTOGRAPH



02 - PHOTOGRAPH



03 - PHOTOGRAPH






04 - PHOTOGRAPH

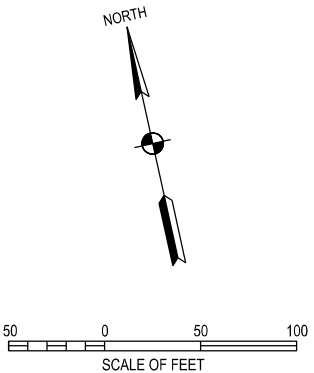


05 - PHOTOGRAPH



06 - PHOTOGRAPH

EXISTING TO REMAIN	DESCRIPTION	EXISTING TO BE REMOVED
NONE	ASPHALT PAVEMENT	
— SD —	STORM DRAIN LINE	NONE
— SS —	SANITARY SEWER LINE	— SS —
— G —	GAS LINE	NONE
— W —	WATER LINE	— W —
—  FH	FIRE HYDRANT	NONE
— UC —	COMMUNICATIONS LINE	NONE
— AP —	AERIAL PRIMARY	— AP —
—  —	POWER POLE	NONE



# DEMOLITION SITE PLAN

SCALE: 1" = 50'

Sheet  
reference  
number:  
**C-101**

Friday, April 29, 2011

Sheet 10 of 22

**DESIGN FILE:**

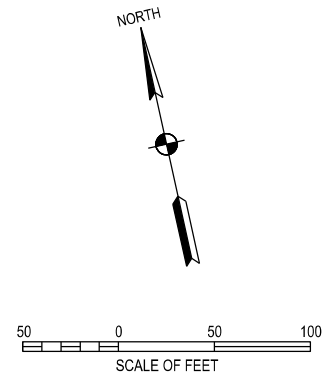
\\projects\active\10\_coe\1228.01\COF\fpcofc-101dem.dgn

3/21/2011



SCALE: 1" = 50'

Sheet  
reference  
number:  
**C-102**  
April 29, 2011  
Sheet 11 of 22



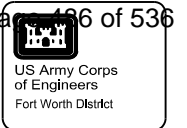
# 1 C-103 PAVING PLAN SCALE: 1" = 50'



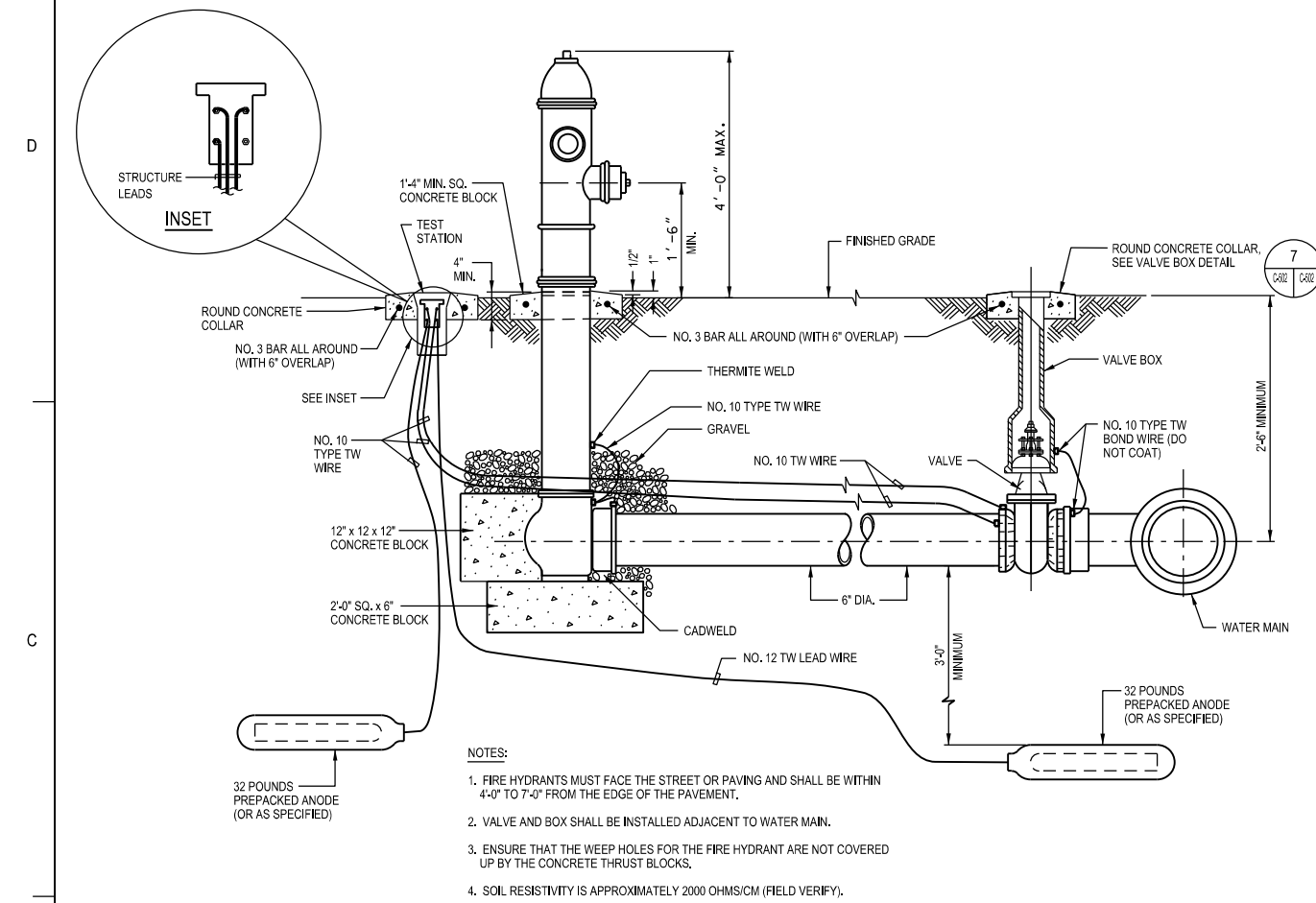
Sheet  
reference  
number:  
**C-104**  
April 29, 201



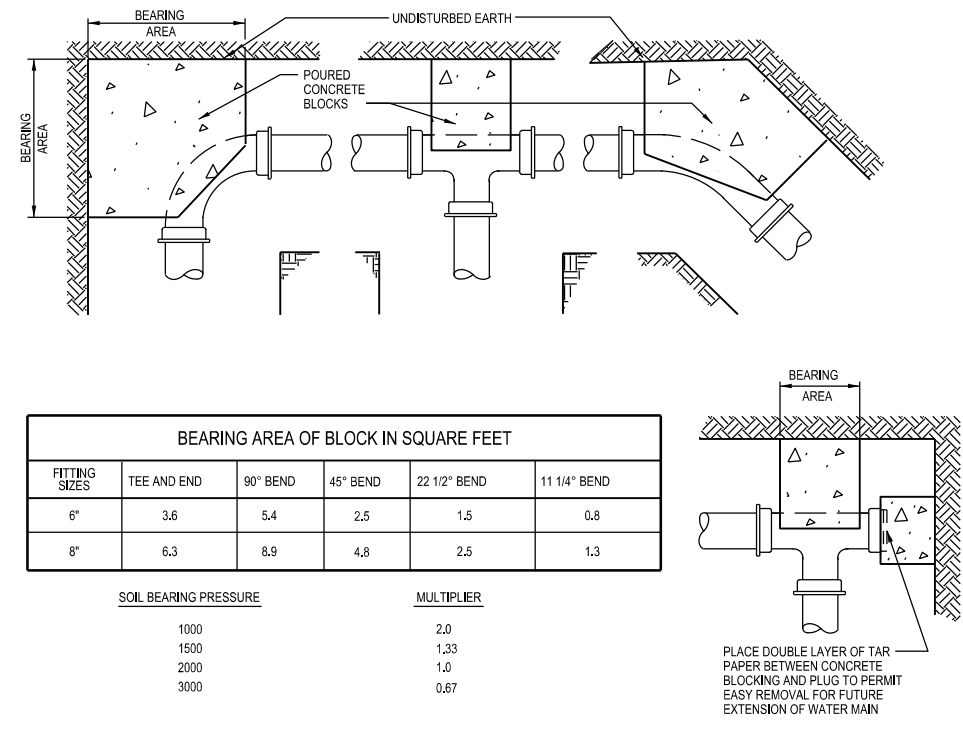




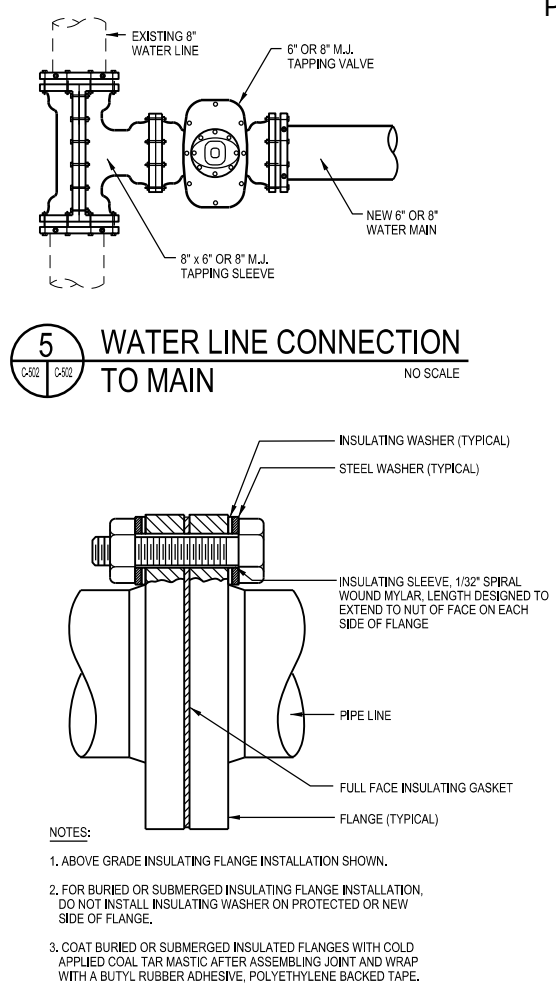
RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION



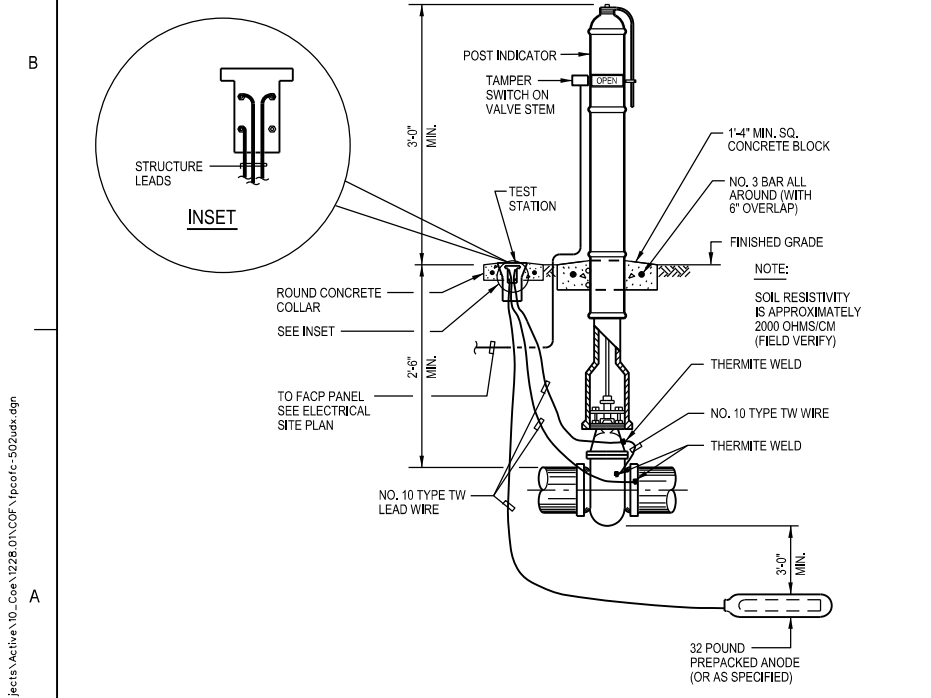
1 TYPICAL FIRE HYDRANT SETTING NO SCALE



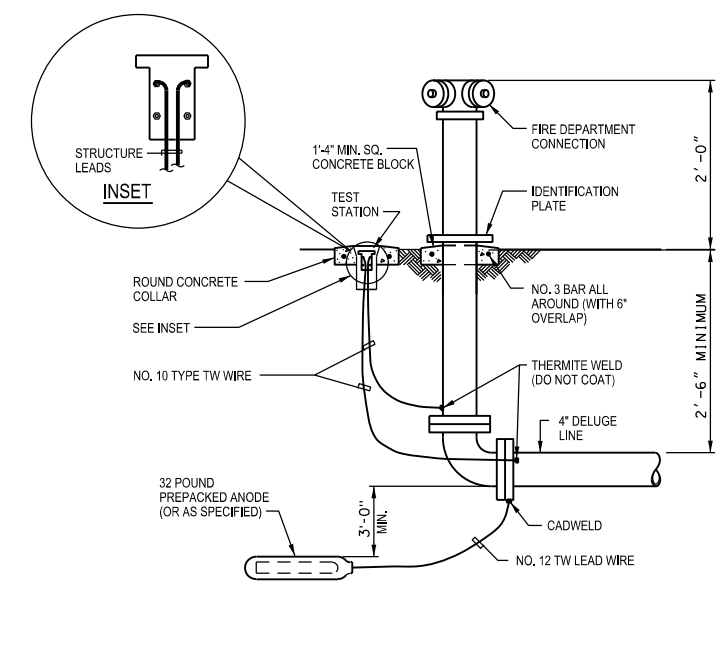
3 THRUST BLOCK DETAILS NO SCALE



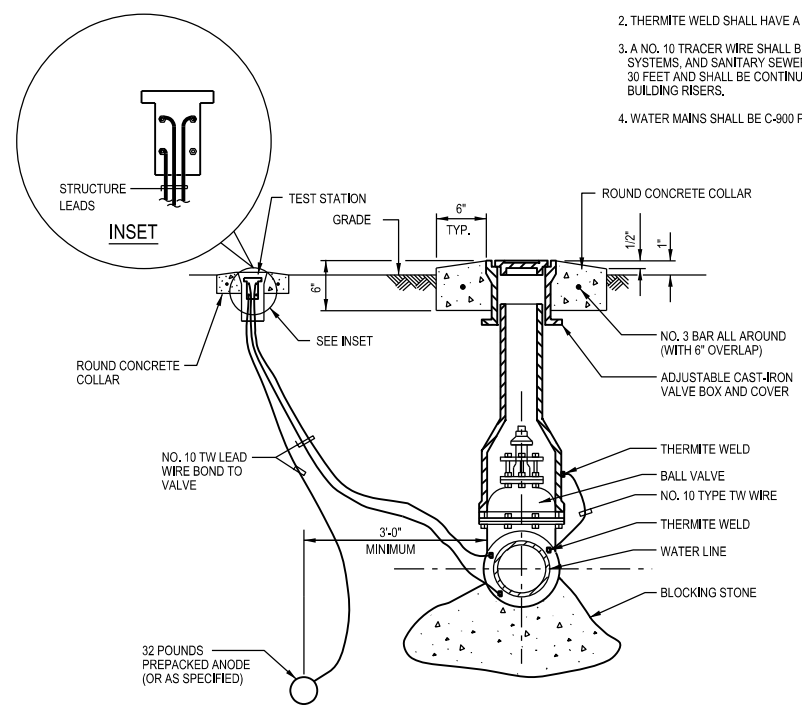
5 WATER LINE CONNECTION TO MAIN NO SCALE



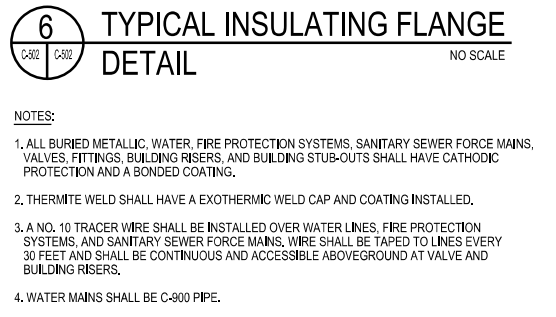
2 POST INDICATOR VALVE NO SCALE



4 FIRE DEPARTMENT CONNECTION NO SCALE



7 VALVE AND BOX DETAIL NO SCALE



6 TYPICAL INSULATING FLANGE DETAIL NO SCALE

Rev.	Date	By	Check	Description

Designed by: K.W. CHAN	Date: MARCH 2011	Reviewed by: K.M. NG	Checked by: K.M. NG	File name: P:\CADD\W912HN-08-D-0037\38\39\40-0005.dwg
Drawn by: C. CHAN	Scale: AS SHOWN	Submitted by: K.M. NG	Engineer: K.M. NG	

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS	UTILITY DETAILS
---	-----------------

I:\Projects\Active\10\_Coe\1228\01\COF\1psofc-502.dwg  
3/21/2011



Friday, April 29, 2011

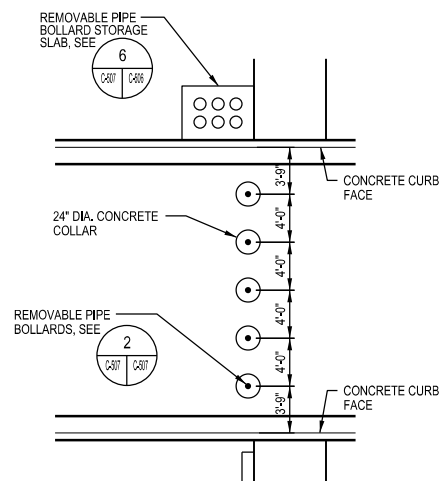




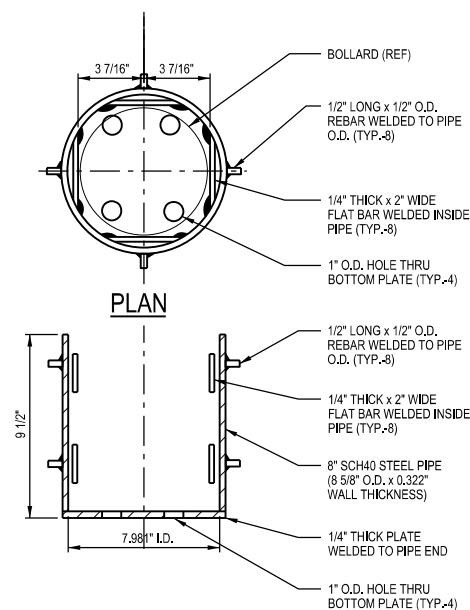


US Army Corps  
of Engineers  
Fort Worth District

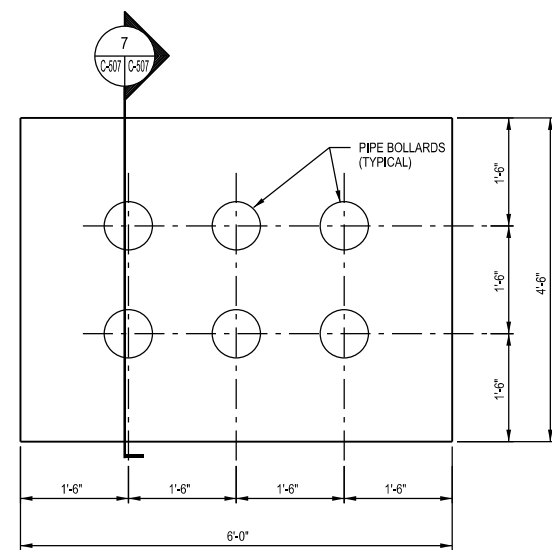
RFP  
SUBMITTAL  
NOT FOR  
CONSTRUCTION



**1 TYPICAL REMOVABLE PIPE BOLLARD LAYOUT PLAN**  
SCALE: 1/8" = 1'-0"

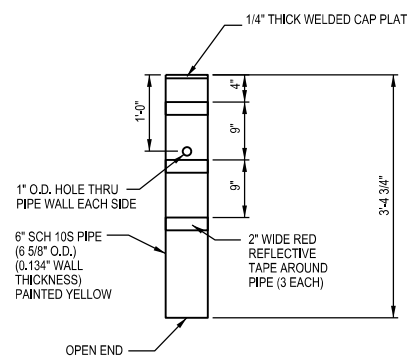
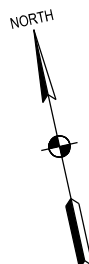


3 SLEEVE DETAIL NO SCALE

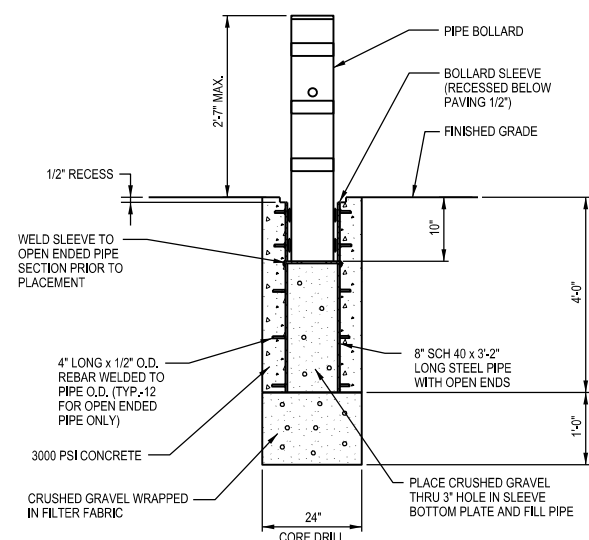


**NOTE:**  
ADJUST SLAB SIZE PER NUMBER OF BOLLARDS REQUIRED.  
REFER TO SITE PLAN, C-102.

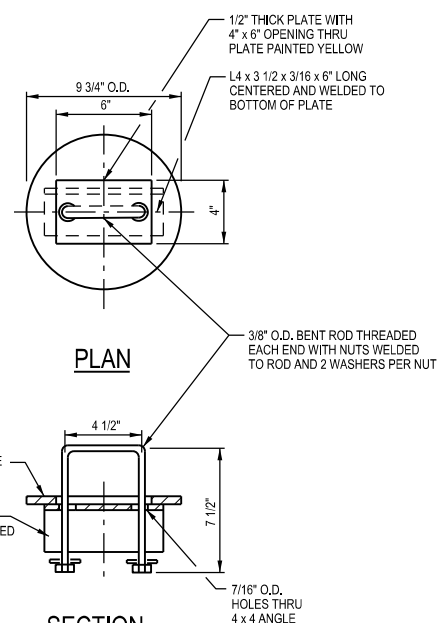
6 REMOVABLE PIPE BOLLARD STORAGE SLAB PLAN VIEW  
C-104 C-007 NO SCALE



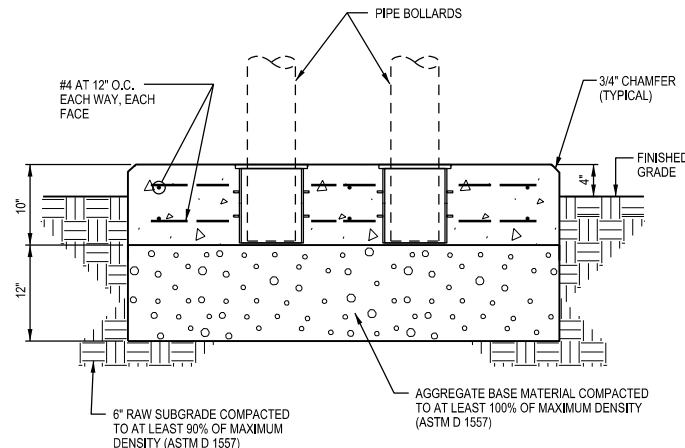
## 4 REMOVABLE PIPE BOLLARD DETAIL



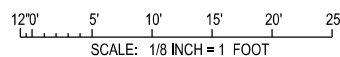
## 2 INSTALLATION DETAIL



5 SLEEVE CAP DETAIL NO SCALE



# 7 SLAB SECTION NO SCALE



<b>U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS</b>	Designed by: <b>KIAI CHAN</b>	Date: <b>MARCH 2011</b>	Rev:
	Drawn by: <b>E. CHAVEZ</b>	Scale:	
<b>K. M. NG &amp; ASSOCIATES, INC.</b> 10000 WILSON ROAD, SUITE 100 SAN ANTONIO, TEXAS 78253 TEL: 214-343-7888 FAX: 214-343-7889 E-MAIL: KONG@KONG-NG.COM WWW.KONG-NG.COM TEAMS REGISTERED ENGINEERING FIRM #442	Reviewed by: <b>KIAI NG</b>	Contract No.:	
	Submitted by: <b>KIAI NG</b>	File name:	
	<b>KUNG KIM NG, PE</b>	Plot date:	<b>MAR. 21, 2011</b>
	<b>ENGINEER</b>	Plot scale:	<b>AS SHOWN</b>

FORT POLK, LOUISIANA  
UNIT OPERATIONS FACILITIES  
PROJECT NO. 069199

Sheet  
reference  
number:  
**C-507**  
April 29, 2011  
Sheet 20 of 22

DESIGN FILE:

Contr. No.





SCALE: 1" = 50'



## APPENDIX LL

### Storm Water Pollution Prevention Plan

## Unit Operations Facility

## SECTION 01 57 24.03 44

STORM WATER POLLUTION PREVENTION PLAN (Louisiana)  
01/2010

## PART 1 GENERAL

**NOTES FOR DESIGNER OF DESIGN-BID BUILD CONTRACTOR:** *Edit this section to provide guideline for Storm Water Pollution Prevention requirements for design-bid-build project that has total disturbed area of one (1) or more acre. The edited section will direct construction contractor to submit a pre-construction and operation specific SWPPP.*

**NOTES FOR DESIGNER OF DESIGN-BUILD CONTRACTOR:** *Prepare pre-construction operation specific SWPPP to be implemented at the job site by a designated and qualified representative.*

## 1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. When providing a resubmittal to address USACE review comments, the Contractor shall include annotated comment responses along with the resubmitted SWPPP (in its entirety). The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-01 Preconstruction Submittals

Storm Water Pollution Prevention Plan (SWPPP or SWP3);G

The construction Contractor site specific SWPPP shall prevent erosion, sediment loss from the construction site, and erosion down gradient of the developed property. To the maximum extent possible, the SWPPP shall (a) limit the area of disturbance to minimize soil loss and prevent the discharge of water quality impaired water from the construction site and (b) incorporate staged stabilization measures as work progresses throughout the duration of the project. The Contractor shall use the current forms (e.g., NOI, NOT, NOC, etc.) required by the LPDES General Permit for Stormwater Discharges From Construction Activities. Additionally, the Contractor shall maintain compliance with the Construction General Permit at all times (even when the Construction General Permit is revised by the issuing agency).

## Unit Operations Facility

**The following summarizes some of the requirements that need to be implemented into the SWPPP as required by the LPDES General Permit.**

(1) The SWPPP shall comprise of three (3) major parts:  
(a) narrative,  
(b) drawings depicting structural and non-structural best management practices (BMPs), and  
(c) permit required documentation (attachments and worksheets) for record-keeping.

(2) The Contractor site specific SWPPP shall consider the phasing of project tasks with the timing of BMPs and construction activities. Additionally, the Contractor site specific SWPPP shall consider the diversion of storm water run-on onto the disturbed portions of the project site, including limiting the area of exposed soil, and retention of sediments from escaping the exposed portion of the site.

(3) The contract drawings depict recommended or suggested BMP types and locations. Any additional BMPs or modifications to the BMPs throughout the project need to be depicted on the drawings included in the SWPPP as well as the text within the SWPPP.

(4) During construction (after USACE approval of construction operation SWPPP), SWPPP or BMP revision is required when site conditions change and when situations arise that may cause potential permit non-compliance. The SWPPP or BMP revision shall be initiated when requested by the Area Office Contracting Officer (AOCO) or as deemed necessary following an inspection conducted by the Contractor designated inspector.

(5) The NOI (when required by the applicable LPDES general permit) shall be separately submitted to all required parties by the construction Contractor and the USACE as co-operators of the construction site.

(6) The Contractor shall sign the Certification of SWPPP, the delegation letter of signatory authorization, the NOI, and the Notice of Termination (NOT) as required by the LPDES General Permit.

(7) The SWPPP must contain a list of regulated materials and construction materials and products, their location, and methods of containment for each product.

(8) The SWPPP must contain a list of wastes, their location, and method of containment.

(9) The SWPPP shall implement procedures that prevent post construction erosion from occurring. Some examples include the use

## Unit Operations Facility

of Scour Stop or equal as velocity dissipators or the placement of composite fiber turf reinforcement mats at down gradient channels.

(10) The following shall be depicted in the SWPPP drawings.

(a) Location of batch plant (if applicable) and drainage features

**The following summarizes some of what is needed to be implemented into the SWPPP as required by the USACE.**

(1) The SWPPP drawings shall be prepared on site grading plans. The drawings shall include four phases or stages of Best Management Practices (BMP) structures layout:

- (a) initial BMP layout at site prior to clearing and grubbing,
- (b) interim BMP layout during grading activities,
- (c) temporary stabilization method and locations, and
- (d) final stabilization method and locations of application.

Notes on timing controls and activities shall be described on the SWPPP drawings.

(2) The SWPPP shall be prepared by a registered professional engineer, a Certified Professional in Erosion and Sediment Control (CPESC), or a licensed landscape architect who has experience with the applicable construction storm water permit as well as the use of sediment and erosion control best management practices (BMPs).

(3) The Contractor designated inspector and any person responsible for maintaining SWPPP compliance with the applicable storm water permit and permit required activities shall attend training on storm water erosion and sediment control compliance/inspections provided by the EPA, state, or vendors (e.g., [www.ieca.org](http://www.ieca.org), [www.teex.org](http://www.teex.org), [www.stormwatercenter.org](http://www.stormwatercenter.org), etc.). The inspector shall provide training certificates from accredited vendors confirming course completion. Documented experience that deals with maintaining compliance with the applicable Construction Storm Water Permit may be substituted for the above mentioned training. Documented experience must be attached to the SWPPP.

(4) The person responsible for maintaining the SWPPP shall provide briefing on the approved Construction Operation SWPPP to all on-site workers.

(5) The SWPPP shall not be submitted to the USACE unless it has been verified to meet the requirements of the applicable state Construction Storm Water Permit. Prior to submitting the Notice of Intent (NOI) (if required per the applicable state Construction Storm Water permit) to all required parties, the construction operation SWPPP shall be approved by the USACE.

(6) The SWPPP must contain the Material Safety Data Sheets (MSDS)

## Unit Operations Facility

for each material on-site or provide a reference in the SWPPP on where the sheets can be found at the project site.

(7) The SWPPP must contain a list and identify the location and method of containment for each type of waste that is to be recycled during the project.

(8) The following shall be depicted on the SWPPP drawings.

(a) A statement that verifies an emergency spill clean-up kit and spill containment device is at fuel transfer points at all times.

(b) A statement that verifies fuel tanks or fueling trucks have overfill protection devices.

(c) Construction details for all BMPs used on the construction site (e.g., BMPs for the fuel storage areas, concrete wash-out pit, borrow area, batch plant, stabilized construction access, etc.)

(9) Include a copy of this SECTION.

## SD-11 Closeout Submittal

## Notice of Termination; G; PER-EE

If a NOI has been submitted, a copy of the original Notice of Termination (NOT) shall be submitted to the regulatory agency and to all required parties. Prior to submittal of the NOT, Contractor shall inspect the finished site with the Area Office Contracting Officer (AOCO) and obtain photographs to prove establishment of final soil stabilization and removal of BMP controls. A copy of NOT and photographs shall be provided to PER-EE through the AOCO. The construction Contractor shall retain all documents pertaining to Construction Storm Water Permit for at least three (3) years after NOT submittal.

## 1.2 SUMMARY

The Contractor shall verify that the most current forms (e.g., NOI, NOC, NOT, etc.) are submitted with the SWPPP.

The Contractor shall not commence soil disturbance until approval of the site specific SWPPP is obtained from the USACE along with the USACE SWPPP certification, and USACE NOI (if applicable). Additionally, all required waiting periods as described in the LPDES General Permit must also be met before soil disturbing activities may begin.

There is no separate payment for work required in this section.

## Unit Operations Facility

## 1.2.1 Site Operators, Responsibilities, and Shared SWPPP

Both the U.S. Army Corps of Engineers (USACE) and the construction Contractor meet the definitions as operators for the construction activities and operate under a shared SWPPP that addresses the requirements of the LPDES General Permit.

## 1.3 PROJECT IDENTIFICATION

PROJECT TITLE: [\_\_\_\_\_]

LOCATION: [ ], Louisiana

## 1.4 PROJECT DESCRIPTION

**NOTES: Provide a brief description of project site and associated construction activities (i.e. clearing and grubbing; grading; concrete and asphalt pavement; fencing; landscaping; describe project location; necessary site work and utility service lines; and demolition, recycling and disposal of regulated substances, etc.). Reference Civil Design Analysis and drawings for site info. Identify the total project area (acres) for the proposed construction and the existing demolition sites (reference NPDES General Permit for definition on total disturbed site). The total disturbed area includes**

**number of acres where construction activities will occur, construction right-of-way, off-site material storage area, overburden and stockpiles of dirt, borrow area, spoil area, and laydown area. Construction support facilities are to be determined by the construction Contractor.**

The scope of this project includes construction of new [\_\_\_\_], [storm sewer,] [sanitary sewer,] [[\_\_\_\_],] [parking lots,] [access drives,] [sidewalks,] [lighting,] [security fence,] [communication system,] and[[\_\_\_\_],]. [In addition, this project shall include demolition of [\_\_\_\_] at [\_\_\_\_].] The total project area of the new construction site includes [off-site material storage,] [overburden and stockpiled material,] [borrow areas,] is roughly [\_\_\_\_] acres. [The total project area of the remote demolition site is roughly [\_\_\_\_] acres]. The total disturbed area [including the new construction and remote demolition sites] in this contract is roughly [\_\_\_\_].

## 1.5 BID OPTIONS AND PROJECT PHASING

There are [no] Bid Options for this project. [They are:

[\_\_\_\_\_]

## Unit Operations Facility

[\_\_\_\_\_]]

[Project Phasing Activities include:

[\_\_\_\_\_]

[\_\_\_\_\_]]

## 1.6 STANDARD INDUSTRIAL CLASSIFICATION (SIC)

**NOTES:** *SIC codes are obtained from the Standard Industrial Classification Manual published by Office of Management and Budget (OMB). For construction activity permit, the primary and sometimes the secondary codes will be for the construction activity. The second through the fourth codes will generally relate to the ultimate use of the project. Use one (1) to maximum of four (4) codes as needed to adequately describe the project.*

[1521 General Contractors - Single Family Houses]

[1522 - General Contractors - Residential Buildings, other than Single Family (i.e., barracks)]

[1541 - General Contractors -Industrial Buildings and Warehouses]

[1542 - General Contractors - Non-Residential Building, other than Industrial Buildings and Warehouses (i.e., administrative buildings)]

[1611 - Highways and Street Construction, Except Elevated Highways]

[1623 - Water, Sewer, Pipeline, and Communications and Power Line Construction]

[1629 - Heavy Construction, Not Elsewhere Classified (i.e., athletic fields, cofferdams, dikes, boat docks, railroads, reservoirs, water or sewage treatment plant)]

[1771 - Concrete Work (includes asphalt; i.e., access drives and parking lots, culvert construction)]

[1794 - Excavation Work (include trenching and earth moving)]

[4581 - Airports, Flying Fields, and Airport Terminal Services]

[7033 - Recreational Vehicle Parks and Campsites]



## Unit Operations Facility

[7538 - General Automotive Repair Shops]

[7699 - Repair Shops and Related Services, Not Elsewhere Classified  
(i.e., military equipment repair, machinery cleaning)]

[7999 - Amusement and Recreation Services, Not Elsewhere Classified  
(i.e., beaches, fishing piers, picnic grounds)]

[8062- General Medical and Surgical Hospitals]

[9711 - National Security (a general category for military  
facilities)]

## 1.7 LOCATION

**NOTES:** *Provide a narrative of the project location, including street names or easily recognized landmarks. As a minimum, include the following: (1) project site street name and boundary streets, (2) latitude and longitude of the project center to the nearest 15 seconds, or (3) quarter, section, township, and range in which the project is located. Describe all disturbed areas, and off-site support functions and locations for proposed facilities and remote demolition sites.*

The new facility project site is within the city boundary of [City name] and is in [COUNTY name]. The project site is bounded by [name all adjacent streets]. The new facility project center is located approximately at [\_\_] degrees [\_\_] minutes [\_\_] seconds latitude, [\_\_] degrees [\_\_] minutes [\_\_] seconds longitude. The physical address for the new facility is [\_\_]. The demolition site is bounded by [\_\_]. [The demolition site project center is approximately at [\_\_] latitude and [\_\_] longitude. The physical address of the demolition site is [\_\_\_\_].] [The project borrow and material disposal area is within the project boundary.] [The project borrow area is off-site at LAT [\_\_\_\_] and LONG [\_\_\_\_]. The project disposal area is off-site at LAT [\_\_\_\_] and [\_\_\_\_] LONG.]

## 1.8 RECEIVING WATERS

**NOTES:** *Identify the body of water that receives site runoff. If it is a tributary to a major river, identify both the tributary and the river. If runoff is collected by a storm drainage system, identify the operator of the system (i.e., the name of the military installation or municipality, the creek adjacent or on site, MS4, the ultimate receiving water body, etc.)*

## Unit Operations Facility

The storm runoff from the new facility site flows [direction] [into new storm drain] [by sheet flow], then flows [direction] to [name of Creek] ultimately to [name of River] [name of Basin]. [The storm runoff from the demolition site flows [direction] [to storm drain] [by sheet flow], then flows [direction] to [\_\_\_\_].]

## PART 2 SITE DESCRIPTION

## 2.1 EXISTING CONDITIONS

**NOTES:** *Describe current site conditions. Include information on drainage patterns and runoff coefficients. Also discuss the design storm frequencies used for runoff volume calculations. If the site is located adjacent to an existing industrial facility or in a community greater than 100,000 people, records of storm water quality near your site may be available. Include storm water quality records for the site (if it is available).*

The site generally slopes from [north] [northwest] [northeast] [west] [east] [southwest] [southeast] [\_\_\_\_] to [north] [northwest] [northeast] [west] [east] [southwest] [southeast] [\_\_\_\_] with an average slope of [\_\_] percent. There are currently [no] [an existing] underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from [\_\_\_\_] to [\_\_\_\_]. Ten-year storm frequency and [\_\_] minutes duration with [\_\_\_\_] inches per hour intensity was used for the design of the storm drainage system. [There are currently [no] [an existing] underground storm drainage facilities at the demolition site. The demolition site generally slopes from [east] [south] to [north] [west] with an average slope of [ ] percent.]

## 2.2 FINAL CONDITIONS

**NOTES:** *Describe site conditions and drainage upon completion of construction activities. Include estimates of future runoff coefficients. Describe features of the storm water system and storm water management (i.e., erosion control and velocity dissipation devices).*

Grades at the new facility site will not change significantly and is roughly about [\_\_\_\_] percent from [north] [northwest] [northeast] [\_\_\_\_] to [\_\_\_\_]. Completed facility site drainage will flow [into a new underground drainage system] [by sheet flow]. The grades surrounding the building is approximately [\_\_\_\_] percent grade. The new project site will have a [building,] [access roads,] [service drives,] [\_\_\_\_], [landscaping] [and turfing]. Estimated future runoff coefficients vary from [\_\_\_\_] to [\_\_\_\_].

## Unit Operations Facility

## 2.3 CONSTRUCTION ACTIVITIES

The Contractor shall establish storm water BMP control structures prior to conducting site disturbing activities. The Contractor shall maintain temporary and permanent site stabilization at each portion of site.

The Contractor shall maintain a record of the START date of major construction site activities (i.e., clearing and grubbing, grading, trenching and excavation, dirt moving, etc.), the STOP date when construction activities cease on a portion of the site, and the START date of stabilization measures (such as sod, seeding with native seed, vegetative buffer strips, erosion control compost, turf reinforcement mat, SCOUR STOP, etc.). See SECTION 01 57 24.02 44 SWPP PLAN INSPECTION AND MAINTENANCE REPORT FORM for an example of a grading and stabilization log sheet.

## 2.4 SOILS DATA

The SWPPP narrative shall provide soils information of the proposed construction site. Possible sources of information are project soil reports, USDA soil survey data, and other published sources. Information can be found at <http://websoilsurvey.nrcs.usda.gov/>.

## 2.5 STORM WATER POLLUTION PREVENTION DRAWINGS

Each SWPPP drawing shall have a specific sheet number and title.

**The following describes the items that need to be identified in the drawings of the SWPPP as required by the LPDES General Permit.**

- (a) Direction(s) of stormwater flow and approximate slopes anticipated after grading activities;
- (b) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);
- (c) Locations of major structural and nonstructural BMPs identified in the SWPPP;
- (d) Locations where stabilization practices are expected to occur;
- (e) Locations of off-site material, waste, borrow or equipment storage areas;
- (f) Locations of all waters of the United States (including wetlands);

## Unit Operations Facility

- (g) Locations where stormwater discharges to a surface water; and
- (h) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.
- (i) A general location map.

**The following describes the items that need to be identified in the drawings of the SWPPP as required by the USACE.**

(a) Existing site features and BMPs -- name of receiving waters (e.g., lake, stream, creek, river, unnamed tributary of named receiving stream, etc.), project site storm water discharge locations, existing storm grates, outfall protection devices, and BMPs.

(b) Interim grading site drainage features and BMPs -- slopes with rough grading, limit of soil disturbance area, outline of areas not to be disturbed (e.g., vegetative buffer zones, cultural resources, wetlands, and areas of environmental concern), new storm grates, new drainage outfalls, and BMPs.

(c) Areas to receive temporary stabilization. Methods of stabilization shall be identified along with the applicable specification for the stabilization (e.g., native seed mix at a certain application rate in lbs/sq-ft, etc.).

(d) Areas to receive final stabilization. Methods of stabilization shall be identified along with the applicable specification for the stabilization (e.g., native seed mix at a certain application rate in lbs/sq-ft).

(e) On-site and off-site material borrow areas, clean dirt disposal areas, and BMPs. Stabilized access roads, construction support activities and laydown areas (equipment, staging, parking, and storage areas) along with the BMPs.

(f) Concrete or asphalt batch plant and BMP (if applicable).

(g) BMP construction details for all erosion control and stabilization and sediment control BMPs (e.g., BMPs for the fuel storage areas, concrete wash-out pit, borrow area, batch plant, stabilized construction access, seeding type, silt fence, etc.)

(h) EROSION AND SEDIMENT CONTROL PLAN I (demolition site)

(i) EROSION AND SEDIMENT CONTROL PLAN II (existing site conditions depicting run-on flow diversion BMPs and run-off BMPs)

(j) EROSION AND SEDIMENT CONTROL PLAN III (interim site grading conditions depicting run-off BMP, swales BMP, storm grates BMP, and

## Unit Operations Facility

temporary stabilization areas & method specification)

(k) EROSION AND SEDIMENT CONTROL PLAN IV (complete site grading conditions depicting run-off BMPs, swales BMPs, storm grates BMPs, and final stabilization areas and method specification)

(l) Notes on timing of controls of activities

## PART 3 BEST MANAGEMENT PRACTICES (BMPs) - EROSION AND SEDIMENT CONTROLS

## 3.1 TEMPORARY STABILIZATION

Stabilization measures shall be in conformance with LPDES General Permit Part IV.D.2.a(2) and Part III.D.2.a(2) for large and small construction activities, respectively.

The Contractor shall provide all necessary labor, services, equipment, materials (e.g., fertilizer) to obtain, transport, apply, and maintain the temporary stabilized area until final stabilization is performed.

Some examples of acceptable methods for temporary stabilization include water sprinkling with environmental sustainable soil binders (e.g., products produced by Soilworks, LLC, DirtGlue Enterprises, SoilLok, or similar) or anchored straw mulching (typically applied at 2 tons per acre). The construction SWPPP may specify other forms of temporary stabilization methods that are industry accepted and are applicable for the project site conditions.

## 3.2 PERMANENT STABILIZATION

Stabilization measures shall be in conformance with LPDES General Permit Part IV.D.2.a(2) and Part III.D.2.a(2) for large and small construction activities, respectively.

The Contractor designated inspector shall inspect the site with the USACE AOCO to ensure final stabilization is established. Final stabilization is defined as described in the LPDES General Permit. If final stabilization is unsatisfactory, additional measures shall be required by the USACE AOCO. If applicable, additional seeding shall be performed after temporary removal of the erosion control blankets and subsequent replacement of blankets after such activities are completed. If applicable, the Contractor's SWPPP shall specify the native seed mix species and application rate (lbs/sq-ft). Some examples of acceptable methods for permanent stabilization includes sodding, pavement, and rock blankets.

## Unit Operations Facility

## 3.3 SEDIMENT BASIN

**NOTE:** See LPDES General Permit Part IV.D.2.a(3) and Part III.D.2.a(3) for large and small construction activities, respectively.

The [NPDES Storm Water Discharge General Permit requires a temporary sediment basin for sites where 10 acres or more are disturbed at one time. [If the disturbed site drains to a common location, a sediment pond or trap shall be constructed as initial grading activity. The pond shall be prepared by the site designer and it shall include layout and construction details. [The runoff from the site does not drain to a common collection point; therefore, a temporary sediment basin is not required.] [A series of smaller sediment basins are constructed to provide for temporary sediment control is depicted on the grading plan.] [A series of smaller sediment basins are not attainable, therefore effective sediment controls (i.e. vegetative strips and silt fences) are established on all the down slope areas of the disturbed site perimeter to control sediment in runoff]. [A construction sediment basin in not attainable because\_] [Temporary sediment pond receives final grade as a permanent sediment pond to manage storm runoff at the finished site.] [A temporary sediment basin is not required because construction activities at each portion of the disturbed site is less than 10 acres.]. The following elements are required if a sediment pond is constructed as an initial site activity: The slopes of sediment pond shall be stabilized with an effective form of temporary/permanent stabilization (as applicable). The storm water shall be allowed to settle after each rainfall event before dewatering in accordance with the applicable Construction General Permit.

## 3.4 STRUCTURAL CONTROLS

See SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL.

## 3.5 NON-STRUCTURAL CONTROLS

The Contractor (and the subcontractors) shall be responsible for eliminating pollutants in storm runoff from the project site. The Contractor (and subcontractors) shall be responsible for utilizing non-structural BMPs to minimize storm water pollution. Some examples of non-structural BMP include:

- Construction Practices
- Material Management
- Waste Management
- Vehicle and Equipment Management
- Employee and Subcontractor Training
- Storm Water Pollution Prevention Plan Maintenance

## Unit Operations Facility

## 3.5.1 Construction Practices

Dewatering Operations: The Contractor (and subcontractor) shall prevent discharge of sediment by methods of sediment control, containment, and disposal. In project areas suspected of potential toxic or petroleum products contamination, the water shall be tested to determine method of disposal.

Paving Operations: The Contractor (and subcontractor) shall avoid discharge of pollutants to storm drains by avoiding asphalt and concrete paving in wet weather or anticipation of such event, storing material in covered containers, covering and berming storage areas, establish control structures, cover on-site storm grates, and worker and subcontractor training.

Structure Construction and Painting: The Contractor (and subcontractor) shall prevent pollutants in storm runoff by covering, or berming material storage areas, keeping job site clean and orderly, using safer alternate products, stabilizing adjacent disturbed areas, storing material in secondary containment, protecting on-site storm drains, establish control structures, and perform worker and subcontractor training.

**USACE Requirements**

Stockpiles: Material shall have a storm water perimeter control devices established at a minimum distance of 10 feet from the toe of the stockpile. Materials excavated from utility trenching shall be protected from up gradient storm run-on.

## 3.5.2 Material Management

Material Delivery and Storage Practice: The Contractor (and subcontractor) shall prevent or reduce discharge of pollutants to storm water by minimizing the on-site storage of hazardous and toxic (HT) materials, storing HT in clearly labeled, corrosion-resistant containers with secondary containment at designated areas approved by the COR, conducting frequent inspection, keeping current inventory of construction materials on site and training of workers and subcontractor.

Material Use and Inventory: Common on-site materials are pesticides and herbicides, fertilizers, detergents, concrete material, petroleum-based products, fertilizers, tar, asphalt, steel reinforcing bars, other hazardous chemicals such as acid, lime, solvents, curing compounds, sealants, paints, glues, fertilizers, etc. The Contractor (and subcontractor) shall use less hazardous, alternate or environmental friendly material, if available. The Contractor shall have

- (1) a list of construction materials used on site,
- (2) a list of materials and associated potential pollutants, and
- (3) method of storage and containment in the Contractor operation specific SWPPP.

Spill Prevention and Control: The Contractor (and subcontractor) shall store HT material in covered containers and inside a fenced area, have the temporary fuel storage tank bermed or contained to meet applicable Fire

## Unit Operations Facility

Code, place readily accessible spill clean-up materials, have protocol for immediate work stoppage, notification, clean-up, labeling, storage and packaging, transportation, disposal, record-keeping, closure activities, and provide training to workers and subcontractor for response to spills.

## 3.5.3 Waste Management

**Non-Construction Wastes:** The Contractor must minimize pollutant discharges from areas other than construction (including stormwater discharges from dedicated asphalt plants and dedicated concrete plants).

**Construction and Waste Materials:** The Contractor must: 1. Prevent the discharge of solid materials, including building materials, to waters of the United States, except as authorized by a permit issued under section 404 of the CWA; 2. Minimize exposure of construction and waste materials to stormwater, and the occurrence of spills, through the use of storage practices, prevention and response practices, and other controls; 3. Prevent litter, construction debris, and construction chemicals (e.g., diesel fuel, hydraulic fluids, and other petroleum products) that could be exposed to stormwater from becoming a pollutant source in stormwater discharges.

**Solid Waste Materials:** Trash and uncontaminated construction debris shall be placed in appropriate covered waste containers. Waste containers shall be emptied regularly and shall not be allowed to overflow. The disposal area of excavated material from project construction shall not be utilized for waste disposal. Routine janitorial service shall be provided for all construction buildings and surrounding grounds. No construction waste materials, including concrete, shall be buried or otherwise disposed of on-site. The Contractor shall brief all on site personnel on good house-keeping and waste minimization.

**Solid Waste:** Solid waste materials (e.g., grout, mortar or uncontaminated debris) shall be placed in covered containers. Trees and shrubs from site clearing shall be shredded and used as mulching material after site stabilization. Packaging materials such as wood, plastic, and paper shall be recycled to the maximum extent possible and not disposed of in a landfill. It is a requirement to perform recycling (see SECTION 01 74 19). The Contractor shall designate waste containers for segregating waste (municipal, metal, aluminum, plastic, wood pallet, packaging, glass, etc.) Dry paint cans shall be recycled. The Contractor shall designate waste disposal area, have a routine janitorial service for all structures and surrounding grounds, and have a routine schedule to service waste containers. The disposal area of excavated material from project construction shall not be utilized for solid or refuse waste disposal. Personnel on the job site shall be briefed on minimizing disposal to landfill by waste segregation and recycling.

**Hazardous and Toxic Waste:** All excess on-site material such as paints, solvents, petroleum products (e.g., fuel, oil, and grease, etc.), herbicides, pesticides, acids for cleaning masonry, concrete curing compounds, sealants, paint strippers, wastes from oil-based paint, and glues can become HT waste. Containers of excess material shall be labeled and managed according to the labels and as recommended by the product manufacturers. If there are no instruction provided, the Contractor shall turn in contained waste to the installation DRMO, the local household



## Unit Operations Facility

hazardous waste drop-off, or recycling program.

**NOTE: DELETE IF REGULATED MATERIAL ABATEMENT IS NOT APPLICABLE TO THE PROJECT.**

Demolition: [Buildings to be demolished under this Contract shall require removal of the following regulated materials:] [mercury fluorescent lights], [PCB or TCB/DEPH ballasts], [items containing ozone depleting chemicals], [mercury bulb thermostats], [items containing lead-based paint or pipe joints],

and

[asbestos-containing building material] [items containing CFC] [\_\_\_\_\_]. [Asbestos-containing materials shall be handled and disposed of in accordance with Section 02 82 14.00 10 ASBESTOS HAZARD CONTROL ACTIVITIES prior to building demolition.] [Lead hazard control activities shall be performed in accordance with Section [ 02 83 19.00 10 LEAD BASED PAINT HAZARD ABATEMENT, TARGET HOUSING & CHILD OCCUPIED FACILITIES] [ 02 82 16.00 20 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS] [ 02 83 13.00 20 LEAD IN CONSTRUCTION]. [Other regulated materials shall be removed and managed in accordance with Section 02 84 00.00 44 REMOVAL, RECYCLING, AND DISPOSAL OF REGULATED MATERIAL.]

Contaminated Soil: If suspicious of soil contamination during soil moving activities, the Contractor (and subcontractor) shall stop work, notify COR, and establish containment to prevent soil transport or runoff from that location. For removal of contaminated soil, a WORK PLAN shall be prepared for COR approval prior to handling and management of the material. The WORK PLAN shall at least include the following: containment, sampling & analyses, notification to regulatory agencies, transportation, worker safety, training & environmental monitoring, disposal, and documentation and record-keeping.

Construction and Concrete Waste: Construction waste or surplus materials, demolition building debris, scrap metal, rubber, plastic, glass, concrete, and masonry products shall be segregated and recycled to minimize landfill disposal. No construction waste shall be buried or disposed of on-site. Concrete waste shall be controlled and minimized by appropriate storage methods for dry and wet materials, and control the amount of concrete and cement mixed on site. Sweepings from exposed aggregate concrete shall be collected and returned to aggregate stockpile and they shall not be washed into streets or storm drains. Concrete wastewater from wash pit is not permitted to discharge as storm runoff. See SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL for additional concrete wash-out requirements. After project completion, the Contractor shall contain wastewater, clean the basin, test and dispose of wastewater and sediment in accordance with applicable regulations and to the satisfaction of the USACE AOCO. The Contractor is responsible for all fees, levies, and disposal cost and shall provide a treatment facility signed delivery ticket.

## Unit Operations Facility

Sanitary/Septic Waste: On-site sanitary facilities shall be established at a convenient location. Facility location, design, maintenance, and waste collection practices shall be approved by COR and are in accordance with local regulations. The Contractor (and subcontractor) shall have a routine schedule for waste pump out by a licensed hauler. Septic waste treatment system shall have a pre-construction permit from the local health regulating agency and have contract service with a licensed company. Temporary sanitary facilities discharging to sanitary sewer system shall be approved by the operator of the system and properly connected to avoid illicit discharges. Wastewater from water-based paint shall not be discharged as sanitary waste.

Building Exterior Cleaning or High-pressure Wash: Storm drains shall be protected by approved storm water control device. Wash onto dirt area, spade in, settle solids in pit, collect (mop up) and discharge to sanitary sewer (with approval from sewer operator). If the exterior paint contains lead exceeding the levels stated in the Consumer Safety Standard, mercury or mildewcide, the wash water shall be collected and disposed of as regulated material that will require sampling data for disposal to permitted facility.

Street/Pavement Cleaning: Water used for this activity shall be minimized and sediment basin shall be used to contain wastewater. At completion of construction, the silt shall be removed and disposed of in accordance with applicable regulations, and water from the basin shall be pumped to a sanitary sewer with written approval from the COR.

Dechlorination of Wastewater from Disinfection of New Drinking Water System: Reference SECTION 3 11 00 WATER DISTRIBUTION SYSTEM.

Care of Storm Water from Excavated Areas: Storm water trapped in excavated areas shall be lifted or pumped into a temporary bermed sediment basin or equal measure(s) for sediments removal. The filtered water shall runoff as sheet flow from the sediment removal area. The sediment removal area shall have the maximum separation distance possible from the site drainage outfall.

#### 3.5.4 Dust Control

See SECTION 01 56 00 DUST CONTROL.

#### 3.5.5 Vehicle and Equipment Management

Off-site Vehicle Tracking: The Contractor is required to keep vehicles from tracking soils from the project, borrow, and disposal sites. Temporary parking area(s) to be used 30 calendar days or more for the Contractor's equipment or personal vehicles shall be paved with temporary asphalt. The temporary parking areas shall be removed by the Contractor upon project completion and restored to the satisfaction of the COR.

## Unit Operations Facility

Vehicle and Equipment Cleaning: Washing shall be performed off site at a commercial washing facility that has an oil/water separator as pre-treatment before connection to municipal sewer system. No vehicle washing is allowed on site, unless washing involves the rinsing of a concrete truck and wastewater is trapped in a washout pit with secondary containment.

Vehicle and Equipment Fueling: Fueling shall be off-site unless a written approval is obtained. If fueling on-site is approved, it shall be at least 150 feet from drainage courses.

The Contractor shall provide a construction detail to depict best management practices for fuel storage and fuel transfer/dispensing areas.

Fueling operations shall avoid topping of fuel tank, and avoid mobile fueling of mobile construction equipment. Fueling locations shall use impervious secondary containment (i.e., a liquid-tight berm and an impermeable liner). The containment capacity of the bermed area shall provide at least 110 percent (%) of the stored fluid.

It is necessary to have a clean-up kit and containment bloom (or absorbent material) available at all times for immediate clean-up during fueling. No petroleum fuel, oil or lubricants or products tanks are allowed on-site unless is pre-approved in writing. Emergency cut-off valve and or overfill protection device is required on fuel transfer equipment. The temporary fuel containers placed on-site shall meet the industrial standard, labeled and stored in accordance with applicable Federal, state, and local Fire codes.

In case of spill of hazardous, toxic, and radiological waste (HTRW), the Contractor shall stop work, contain spill, notify the AOCO and Safety Office, and execute spill control per the SPILL CONTROL PLAN as required in specification SECTION 01 57 20 ENVIRONMENTAL PROTECTION . Spill control, response, notification, clean-up, restoration, reporting, record-keeping, etc. shall be in accordance with 40 CFR 110 and 40 CFR 112 , other applicable Federal, state, and local regulations, and to the satisfaction of the AOCO.

Vehicle and Equipment Maintenance: Outdoor vehicle or equipment maintenance is a significant potential source of storm water pollution. Activities often include engine repair, changing fluids, etc. Such activities shall be prohibited at the job site. The construction Contractor shall verify proofs on routine maintenance of construction equipment and vehicles before bringing them to the job site.

Vehicle and Equipment Parking: Vehicle or equipment shall be regularly inspected for leaks and schedule routine maintenance to reduce the potential for leaks. If leaks are observed at the job site, such vehicle or equipment shall be repaired immediately or removed from the site.

### 3.5.6 Employee and Subcontractor Training

The Contractor is responsible for providing training for all workers

## Unit Operations Facility

(including the subcontractor) on the job site. The objectives in training are to provide a clear concept of activities or problems that generate pollutants to storm water, identify solutions (BMPs), promote ownership of the problems and solutions, and integrate feedback into training and BMP implementation. A certificate to verify completion of training shall be signed by all trained personnel and retained in the SWPPP.

## 3.5.7 Storm Water Pollution Prevention Plan Maintenance

The USACE approved SWPPP shall be readily available to inspector either from the USACE or regulatory agency. The USACE approved BMPs and SWPPP shall be revised at no cost by the construction Contractor when there are changes in site conditions, sequence of construction and operation, when sediments escape from the job site, or as dictated by the results of inspections. The BMPs and SWPPP shall be updated by the construction Contractor upon request of the USACE AOCO.

## PART 4 STORM WATER MANAGEMENT AND PERMANENT CONTROLS

*NOTE: The number and headings of these subsections will vary significantly from project to project. Use as many subsections as necessary to adequately describe erosion and sediment controls for the completed project site. While designing the site layout and grading plans, the design engineer should include features that will limit erosion and control sedimentation once project construction has been completed. Permanent structures may include curbs and gutters, storm drains, drainage ditches, culverts, pavement slopes, etc. Indicate storm frequencies and durations used for design purposes. Subsections may include, but are not limited to: RUNOFF COMPUTATIONS, STORM DRAINAGE SYSTEM, VEGETATIVE BUFFER STRIPS, DRAINAGE SWALES AND DITCHES, DRAINAGE CULVERTS and all measures discussed in SECTION 01 57 23 STORM WATER POLLUTION PREVENTION MEASURES.*

*All sites for new construction and demolition shall be separately addressed. Units of measure used shall match the construction project.*

*The SWPPP designer shall determine if there are concerns associated with the discharges from sources other than storm water. The SWPPP designer shall consult with the construction Contractor to determine concrete washout pit capacity at the job site to provide total containment of concrete detention and the designed storm event.*

## Unit Operations Facility

## 4.1 RUNOFF COMPUTATIONS

The storm drainage design is based on a [10] [ ]-year storm frequency and [10] [ ]-minutes duration with [ ] inch per hour rainfall intensity.

## 4.2 SURFACE DISCHARGE QUALITY

The wastewater from concrete washing activity is prohibited from discharging as surface runoff. See Part 3.6.5 of SECTION 01 57 20 ENVIRONMENTAL PROTECTION.

## 4.3 PERMANENT EROSION CONTROL STRUCTURES AND STORM WATER TREATMENT UNIT

Permanent drainage structures, including [concrete curbs and gutters,] [storm drainage system,] [concrete pavement,] [asphalt pavement,] [drainage swale,] [drainage ditch,] [turbing,] [vegetative strip,] [concrete culvert,] [pipe culvert,] will provide erosion control at the project site.

[Storm water treatment unit shall have a stainless steel expanded screen opening of at least 4700 microns (4.7 mm or 0.185 inches) to remove sediment.]

## 4.4 OUTLET PROTECTION OR OUTFALL VELOCITY DISSIPATION DEVICES

**NOTE: Identify velocity dissipation or outlet protection device to provide non-erosive flow conditions at the point of surface drainage discharge. New construction and demolition sites shall be addressed separately.**

The outlet protection or outfall dissipation device shall provide non-erosive flow conditions at the point of surface water discharge to the ditch or swale and downstream of the outfall or channel. [The proposed storm drain shall be discharged into [ ] [flow channel] [ ] x-inches diameter storm drain pipe] .] The outfall impact locations are protected by [e.g., SCOUR STOP or equal]. The drainage channels are protected by [e.g., seeding on prepared soil surface with ECC and overlay with composite turf reinforcement mats] [composite turf reinforcement mats overlay on solid sod] .

## Unit Operations Facility

## PART 5 TIMING OF CONTROLS AND ACTIVITIES

**NOTE: Discuss the sequence of major construction activities and how the related pollution prevention measures will be implemented. Identify situations which are critical to successful construction and pollution prevention, but will not limit the Contractor's ability to determine construction phasing schedule. NOTES of Timing of Controls and Activities specific for each project shall be depicted on SWPPP drawings.**

The general Contractor shall discuss timing (sequence) of controls and construction activities to minimize soil loss from exposed areas in the construction operation SWPPP.

The following list provides a general example of the Timing of Controls and Activities.

- Minimize area of disturbance,
- Preserve existing vegetation at the downgradient portion of the site, do not disturb ground cover until it is necessary to proceed with field work,
- Install stabilized construction access,
- Install BMPs at contractor staging, stockpiles, storage, parking, borrow areas, and stockpiles (on-site and off-site locations), concrete washout pit, fuel storage/transfer area, etc.,
- Install BMP at existing storm grates (e.g., curb inlets surface inlets, manholes, catch basins, etc.),
- Install flow diversion dike and stabilize. Construct sediment trap at the downgradient end of the dike,
- Track weather and protect exposed areas with erosion control measures before anticipated storms arrive.
- Construct outfall, install BMPs at initial impact location, and stabilize flow channel prior to clearing upper watershed,
- Stage construction to the maximum extent possible by disturbing, protecting, and then stabilizing one side of river bank before disturbing the opposite side,
- Stabilize flow channel,

## Unit Operations Facility

- Clear site for sediment pond (if applicable) and utilize sediment pond skimmer to control overflow,
- Stabilize pond slopes,
- Develop run-on BMP devices and protect loose soil areas,
- Start grading up gradient of site and stabilize disturbed areas,
- Avoid disturbing down slope areas of site until up-gradient disturbed areas are stabilized,
- Delay construction of infiltration measures until the end of project when drainage areas are stabilized,
- Install BMP protections at new storm grates (e.g., curb inlets surface inlets, manholes, catch basins, etc.),
- Protect excavated materials by installing BMP perimeter controls to protect materials from run-on and run-off
- Stabilize stockpiles and install BMPs at least 10 feet from the toe of the material,
- Backfill utility trenches in a timely manner to minimize erosion and soil loss,
- Monitor weather reports to schedule paving (asphalt or concrete), concrete saw cutting, foundation work, dust control, seeding or any activities that will impact run-off,
- Inspect and maintain BMP control structures,
- Evaluate BMP and revise BMP when site conditions or activities change. Maintain Construction General Permit and USACE required field records and training logs,
- Monitor discharge from concrete batch plant (if applicable),
- Maintain stabilized areas until final project acceptance (i.e., watering, fertilize, mow, additional seeding, etc.),
- Verify final stabilization of disturbed areas with AOCO representative. See definition in PART 2.3,
- Remove sediment and BMP control structures once disturbed areas are permanently stabilized and accepted by AOCO. Obtain photographs of site to prove establishment of stabilization and removal of all BMP controls,
- File the Contractor NOT. Provide a copy of NOT through AOCO to PER-EE.

## Unit Operations Facility

## PART 6 COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

NOTE: Army Regulation 200-1 requires that all Department of Defense installations and Contractors to comply with Federal environmental protection statutes, which includes a provision to observe State, and local environmental regulations.

The SWP3 shall identify the document prepared for compliance with the National Environmental Policy Act (NEPA) of 1969, as amended. It shall discuss impact on endangered and threatened species and their (critical) habitats, archeological, cultural and historical resources and properties, wetlands, floodplains, environmental contamination and compliance issue, water resources, ecological resource, land use, noise, air quality. The installation environmental office is responsible to prepare the NEPA document at the project pre-design stage. The Contractor shall request name NEPA compliance document (Record of Environmental Consideration, Environmental Impact Statement, Environmental Assessment), date of signature for findings (Record of Decision or Findings of No Significant Impact), and include information to PART 7.

In compliance with the Clean Water Act, Section 402, a construction site of 0.4 hectare (1 acre) in size, or larger, is required to obtain a National Pollutant Discharge Elimination System (NPDES) from EPA NPDES General Permit for Storm Water Discharges from Construction Activities.

Section 404 of the Clean Water Act (CWA) stipulates discharge of dredge and fill material with jurisdictional Waters of the United States. The civil engineer and environmental planner shall evaluate the proposed site compliance with CWA Section 404. For The proposed site shall be reviewed if it crosses drainage water ways or watersheds (dry creeks and streams could be Waters of U.S.) that are contributing to the Waters of United States. The review process sometimes involved wetland delineation to identify existing national permit coverage or issuance of a Clean Water Act Section 404 Permit. The permit or a permit coverage verification memorandum could require compensatory mitigation. The compensatory mitigation shall become the initial part of construction activity. The construction Contractor shall not start soil disturbing activities until the required compensatory mitigation is implemented or the soil disturbing activities are covered under existing national permit.

The civil engineer and environmental planner shall evaluate the proposed site compliance with Clean Water Act, Section 10, the Rivers & Harbor Act of 1899.

Section 401 of the Clean Water Act stipulates the on-site sewerage discharge. If an on-site sewerage system is required, the Contractor shall prepare drawings and mark-up specifications, obtain a pre-construction permit from the state, regional Environmental Quality Office, or County Health Department. The Contractor shall contact



## Unit Operations Facility

**installation Environmental Office for application of on-site sewerage system pre-construction permit.**

**The Contractor shall resolve all permit compliance issues prior to disturbing soil.**

In compliance with the National Environmental Policy Act of 1969, as amended, the [Environmental Assessment] [Environmental Impact Statement] entitled [ ] dated [ ] has been prepared and the memorandum was signed on [ ].] [Record of Environmental Consideration (REC) dated [ ] has been prepared for this proposed action.] [The [EA] {EIS} [REC] indicates the proposed action is [ ].] [The proposed action has [ ] impact on endangered and threatened species and their critical habitats.] [The attached letter dated [ ] with US Fish and Wildlife Service has determined the following protection measures:[ ].] [The proposed action has [ ] impact on cultural and historical properties, the memorandum dated [ ] from SHPO verified this resolution.] [The proposed action has [ ] impact on noise.] [The proposed project site [ ] encroaches upon floodplains and wetlands.] [The proposed action [ ] impact air quality.] [The proposed site has [ ] environmental compliance issues and an environmental baseline study (EBS) was prepared on [ ]. The EBS indicated that [ ].] [This facility will have an on-site sewerage treatment system and the Contractor shall obtain a pre-construction permit prior to start work.] [The Contractor shall not start field work until [the Clean Water Act Section 10] [and] [Section 404] issues are resolved and a permit is issued or the construction activity is covered under a nationwide permit and a verification memorandum, dated [ ] is completed by the the Permit Section, Regulatory Branch, US Army Corps of Engineers.] [In compliance with the Clean Water Act permit issued on [ ], the Contractor shall furnished work as required for the compensatory mitigation as stipulated by the permit.] In compliance with Clean Water Act, Section 402, the Contractor and the subcontractor shall conform with all applicable NPDES General Permit stipulations to discharge storm water during construction. [The Contractor shall furnish water well development certification in accordance with state and local regulations]. In addition, the Contractor (including the subcontractor) shall comply with the Government approved Contractor's operation specific Storm Water Pollution Prevention Plan, BMP, and contract requirements as stated in this section.

The Contractor (and the subcontractor shall comply with all applicable Federal, state, and local hazardous, toxic, radiological (HTR) waste, municipal waste, sanitary and septic waste disposal regulations.

**PART 7 MAINTENANCE AND INSPECTION PROCEDURES AND QUALIFICATION OF DESIGNATED INSPECTOR**

The Contractor shall designate an inspector on site to ensure Storm Water Permit compliance and perform SWPPP quality control. All BMPs and control structures shall be inspected according to the requirements of Part IV.D.4 and Part III.D.4 of the LPDES General Permit for large and small construction activities, respectively. The inspector shall inspect adjacent areas daily for direct clean-up of waste materials, debris, and fugitive

## Unit Operations Facility

sediment that are blown or washed off-site.

All protective measures used and identified in the SWPPP must have maintenance performed in conformance with Parts IV.D.3 and III.D.3 of the LPDES General Permit for large and small construction activities, respectively.

The designated SWPPP inspector is responsible for maintaining the SWPPP throughout the term of permit coverage in accordance with the LPDES General Permit. All deficiencies shall be corrected and recorded. An example of a form to record this information can be found in SECTION 01 57 24.02 44 SWPPP PLAN INSPECTION AND MAINTENANCE REPORT FORM. A copy of each inspection report form shall also be provided to the AOCO.

## PART 8 PROHIBITION ON NON-STORM WATER DISCHARGES

In accordance with the Part III.A.3 and Part II.A.3 of the LPDES General Permit for large and small construction activity, respectively, non-storm water discharges are prohibited during construction of the project, except for the non-storm water discharges listed below. The following list of non-storm water discharges from active construction sites are allowed and is developed based on the above guideline.

1. Discharges from fire-fighting activities;
2. Fire hydrant flushings;
3. Waters used to wash vehicles where detergents are not used;
4. Water used to control dust in accordance with Part IV.D.2.c(2) and III.D.2.c(2) of the large and small construction general permits, respectively;
5. Potable water including uncontaminated water line flushings;
6. Routine external building wash down that does not use detergents;
7. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used;
8. Uncontaminated air conditioning or compressor condensate;
9. Uncontaminated ground water or spring water;
10. Foundation or footing drains where flows are not contaminated with process materials such as solvents;
11. Uncontaminated excavation dewatering (large construction activity);
12. Landscape irrigation (large construction activity);
13. Landscape irrigation;
14. Uncontaminated ground water infiltration (large activity).

## PART 9 CONTRACTOR COMPLIANCE AND CERTIFICATION

The construction Contractor shall use this SECTION as guidance on how to

## Unit Operations Facility

prepare a construction SWPPP that includes narrative, drawings (see PART 2.5 in this section), and required worksheets. Prior to submitting the NOI (if required to be prepared per the applicable state Construction Storm Water General Permit) to the regulatory agency and all other required parties, the Contractor shall submit the operation and field specific SWPPP with a prepared and signed NOI attached for USACE review and approval.

The construction Contractor and sub-contractor shall each prepare a SWPPP CERTIFICATION. The SWPPP CERTIFICATION assures responsibility and compliance with the permitted discharges of storm water during construction. As such, the SWPPP submitted for USACE review and approval shall have a SWPPP CERTIFICATION prepared and signed by the appropriate approval authority. The USACE sharing the approved SWPPP shall prepare a SWPPP CERTIFICATION. All SWPPP certifications shall be included and retained in the SWPPP.

## 9.1 CONSTRUCTION SWPPP GUIDELINES

An adequate construction SWPPP includes a narrative, drawings, and required worksheets.

The narrative is a written statement to explain and justify the pollution prevention decisions made for a particular project. The narrative shall contain concise information about existing site conditions, construction phasing, BMP practices, construction schedule, and the performance the BMPs are expected to achieve, and actions to be taken if the performance goals are not achieved, and other pertinent items that may not be contained on the drawings.

The narrative shall identify all operators (see PART 1.3 in this section).

The site grading plans provide a baseline to assist in the preparation of the SWPPP drawings. The drawings shall layout various BMP types, locations, and methods of stabilization in accordance with Part IV.D.1 and III.D.1 of the LPDES General Permit for large and small construction activity, respectively, and Part 2.5 of this section.

The SWPPP shall also address the following.

- Describe the location, size, and characteristics of any wetlands, streams, or lakes that are adjacent or in close proximity to the site, and/or will receive discharges from disturbed areas of the project. Also delineate areas with high erosion potential including steep slopes.

- List Threatened and Endangered Species and Critical Habitats.
- List Cultural and Historical Resources.
- Clean Water Act Section 404 Memo or Permit Stipulations
- Septic System Permit
- Water well Permit
- Identify if concrete/asphalt plant is at site

(A batch plant may require coverage of an industrial operation permit)

- Spill Prevention and Control Measures per state or EPA and local

## Unit Operations Facility

- requirements
- Spill Response

If available, submitting by electronic means is the most efficient process for filing an NOI, and therefore recommended. However, the physical address for NOI submission and payment can be found on the NOI form.

## 9.1.1.1 On-Site Construction Document, Signage, And Record-Keeping

**A copy of each of the following shall be maintained in the USACE approved SWPPP in accordance with the LPDES General Permit.**

- Contractor NOI,
- Contractor Certification of SWPPP,
- Contractor Signatory Delegation Letter,
- Contractor BMP Inspection and Maintenance Report,
- Qualification documents (e.g., training certificates) for Contractor personnel that maintain any part of the SWPPP,
- Contractor log for recording Major Construction Activities and Subsequent Stabilization Practices,
- Contractor log for describing construction materials stored on-site, their potential pollutants, and method of containment,
- Contractor log for describing waste materials stored on-site and method of storage,
- Contractor NOT (once the project is complete and the NOT is submitted),
- Contractor Concrete or Asphalt Batch Plant sampling records (if batch plant operation is being conducted),
- USACE Certification of SWPPP,
- USACE NOI,
- Contractor and the USACE storm water discharge permits after receipt from the regulatory agency.

**A copy of each of the following shall be maintained in accordance with USACE requirements.**

- Contractor NOT (append a blank form in the SWPPP to be completed once project is finished and approved by the USACE AOCO),

## Unit Operations Facility

- Contractor's anticipated construction timeline schedule (that includes anticipated dates for soil disturbance),
- Contractor SWPPP Revision Log,
- The SWPPP shall contain label tabs or similar to clearly identify each item/section of the SWPPP,
- The SWPPP shall be retained at the project site at all times,
- A spill response action guide,
- Contractor SWPPP/BMP training log,
- Certification or Notification for a Drinking Water Well and/or Septic Sanitary Sewer System (if applicable).

The Contractor shall post the required items per the applicable LPDES General Permit near the main entrance of each construction access point.

All records pertaining to the Storm Water Permit for discharging water associated with construction site activities shall be maintained, by the construction Contractor, for a minimum of three (3) years from the date specified in Part V.A and Part IV.A of the LPDES General Permit for large and small construction activity, respectively.

#### 9.1.2 Storm Water Discharge General Permit Fees And Fines For Non-Compliance

The Contractor shall be responsible for the initial Contractor storm water discharge permit NOI fee and any subsequent annual permit fees during construction (if required per the applicable state Construction Storm Water General Permit). In addition, if a batch plant is on-site, the Contractor is responsible to obtain samples of surface water discharged at the batch plant. A water sample for water quality analysis shall be analyzed by a state accredited laboratory and data shall be submitted to the regulatory agency for the batch plant operation as required by applicable permit regulations.

Any fines levied by regulatory agency regarding non-compliance with LPDES General Permit shall be the Contractor's responsibility.

#### 9.1.3 Regulatory Inspector Visits

If the regulatory agency inspector visits the job site, the workers shall notify the Contractor Designated Storm Water Inspector immediately. The Contractor's Designated Inspector shall contact the USACE AOCO immediately and both of them shall accompany the regulatory agency inspector to walk the construction site. The Contractor's Designated Inspector shall brief workers daily on the BMP and the SWPPP, logistics of a regulatory agency inspector site visit, and avoid having an unattended regulatory agency inspector on the job site. The Designated Inspector shall assign a responsible person in his/her absence to oversight the logistic of regulatory agency inspector site visit.

## Unit Operations Facility

## 9.2 NOTICE OF TERMINATION (NOT)/COMPLETION REPORT

Notice of Termination (NOT) is applicable for construction activities that submit an NOI. A Small Construction Activity Completion Report (SCACR) is required for small construction activities. If applicable, the regulatory agency will automatically send the annual storm water permit payment notice if a NOT is not received in the data base before a set date each year. The Contractor is responsible to pay any annual fee on a construction storm water discharge permit.

At establishment of final stabilization, the Contractor shall have USACE AOCO approve the project's final stabilization as well as remove sediment and BMP sediment controls, obtain pictures of the permanently stabilized site and removal of BMP controls, and written approval from USACE AOCO. The Contractor shall prepare a NOT and submit his/her own NOT to the appropriate regulatory agency and any other applicable contacts (i.e., MS4s, cities identified in the SWPPP, etc.). The Contractor shall provide two (2) copies of the filed NOT and site photos to the USACE AOCO. The AOCO shall retain a copy of the NOT as project closure documentation and forward the other copy of NOT and photos to CESWF-PER-EE.

For all other construction activities (i.e., ones that do not require a filing of an NOT), the Contractor shall file the proper documentation to the regulatory agency and any other applicable contact (i.e., MS4s, cities identified in the SWPPP, etc.) as described in the LPDES General Permit. A copy of this document submittal shall be provided to the USACE AOCO. The AOCO shall retain a copy of the documents sent to the regulatory agency and other applicable contacts as project closure documentation and forward a copy of all the documents and photos to CESWF-PER-EE.

The Contractor is responsible for fines due to non-compliance with closure documentation for the construction activity storm water discharge permit.

## 9.3 NOTIFICATION TO MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)

Not applicable.

## APPENDIX MM

### Hyperlinks for Additional Information

Louisiana Department of Health and Hospitals Design Summary Forms (Ref. 6.3.1i):

<http://www.dhh.louisiana.gov/offices/publications.asp?ID=204&Detail=1092>

American Water Design Guidance:

<http://www.amwater.com/>

<http://www.amwater.com/files/Fort%20Hood%20Design%20Guide.pdf>

Shorepower Technologies Electric Vehicle Charging Station:

<http://www.shorepower.com/komfortkits.html>

AECC 4.0 CADD Standards

<https://cadbim.usace.army.mil/CAD>

Southwestern Division Architectural and Engineering Instructions Manual (AEIM)

[http://www.swd.usace.army.mil/capabilities/SWD\\_AEIM\\_Jan\\_2003.pdf](http://www.swd.usace.army.mil/capabilities/SWD_AEIM_Jan_2003.pdf)

UFC - Fire Protection Engineering for Facilities

[http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_600\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_600_01.pdf)

DoD Minimum Antiterrorism Standards for Buildings

[http://www.wbdg.org/ccb/DOD/UFC/ufc\\_4\\_010\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf)



## **APPENDIX NN**

### **SECTION 01 35 12.00 44**

#### **SPECIAL PROJECT PROCEDURES FOR FORT POLK**

## APPENDIX NN

## SECTION 01 35 12.00 44

## SPECIAL PROJECT PROCEDURES FOR FORT POLK

## PART 1 GENERAL

## 1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

## SD-01 Preconstruction Submittals

## Excavation And Trenching.

Secure required permits prior to performing any excavation or trenching on the installation.

## SD-07 Certifications.

## Hazardous Material Content.

For applicable materials, furnish manufacturer's certifications that materials installed on this project do not contain asbestos or the lead content does not exceed 0.06 percent (600 ppm).

## Solid Waste Disposition

## Termite Control

## SD-11 Closeout Submittals

## Asbestos Certification Letter.

## CADD And GIS Deliverables.

## 1.2 DIRECTIONS TO FORT POLK AND LOCAL MOTELS

a. The Eastern Area Office is located at 2315 Service Command Loop, Bldg. 4740, Fort Polk, LA 71459. The office telephone no. is (337) 531-2933. See local area maps.

Driving directions from Hwy 171: East on Entrance Road (Name changes to Louisiana Avenue after entering Fort Polk), stay on Louisiana Avenue; turn right on to Texas Avenue (at 7th Traffic Light). 1st left will be Service Command Circle. 1st parking lot on left will be Building 4740.

b. For base access, proceed to the Fort Polk Visitors Center located 2 miles from Highway 171 (on Entrance Road). Valid insurance, registration, and driver's license are required for a one day visitors pass. For more

Ft Polk Unit Ops Hospital COF

FPUOHCOF

information, contact the Fort Polk Visitors Center at (337) 531-4978.

c. Web Sites:

Ft. Worth District Website: <http://www.swf.usace.army.mil/>  
Joint Readiness Training Center and Fort Polk, LA:  
<http://www.jrtc-polk.army.mil/>  
Newcomers: [www.militaryonesource.com](http://www.militaryonesource.com)

d. Hotels located in Leesville, LA

Best Western-337-392-1672  
Holiday Inn Express-337-239-2122  
Country Inn-337-238-3506  
Landmark-337-238-2854  
Days Inn-337-239-2612

e. Hotels located in DeRidder, LA

Stagecoach Inn- 337-462-0022  
Country Inns of DeRidder-337-462-3450

1.3 INSTALLATION ACCESS - CONTRACTOR PERSONNEL (Mar 2011)

Installation Access - Contractor personnel, with exception of Rapid Gate Badge holders, requiring access to Fort Polk must be on an access control roster. These rosters are used by Fort Polk personnel to verify legitimate need for contractors requiring access to the Installation. Primes are responsible for submitting information for their subcontractors. All access rosters, as well as updates, will be submitted electronically. Rosters will be submitted by e-mail to the following addresses:  
[penelope.z.smith@usace.army.mil](mailto:penelope.z.smith@usace.army.mil) cc: [toni.l.schermerhorn@usace.army.mil](mailto:toni.l.schermerhorn@usace.army.mil) .

**PLEASE INCLUDE IN THE SUBJECT LINE OF YOUR EMAIL THE WORDS: ACCESS ROSTER.** In order for an access control roster to be accepted the roster format can not be modified and data must be entered in each column for each employee listed. A complete roster should be submitted by the 5th working day of each month. **Indicate key personnel that require a 6 month pass with purple / lavender highlight.** Additions and deletions will be submitted daily, on an as-needed basis. Should you have both additions and deletions, both can be submitted on the same document, **with additions highlighted in yellow and deletions highlighted in red.** Any organizations submitting electronic access control rosters are required to provide personnel listed on the roster with a copy of the privacy act (provided in Precon packet). Rosters should be submitted 5 days in advance of access to allow time to consolidate the new information in the data base and validate each roster. Once an employee is on the roster they can obtain a vehicle pass at Building 1830, Consolidated In and Out Processing, Telephone: 531-0380. The vehicle pass duration for key personnel will be 6 months and for all others 30 days. To receive an electronic copy of the Access Roster form, contact [penelope.z.smith@usace.army.mil](mailto:penelope.z.smith@usace.army.mil), or [toni.l.schermerhorn@usace.army.mil](mailto:toni.l.schermerhorn@usace.army.mil) .

Personnel that have Rapid Gate Badges do not have to be listed on the access roster and are not required to have vehicle passes. More information concerning the Rapid Gate Program may be obtained by calling 1-877-727-4342.

Ft Polk Unit Ops Hospital COF

FPUOHCOF

#### 1.4 CONTRACTOR LOTS (March 2011)

Contractor lots are available for use during the period of performance on a space available basis. The contractor will have to enter into a lease agreement with the local governing agency, and follow the requirements set forth in such agreement. Coordination with the local governing agency shall be facilitated through the Contacting Officer. Additionally all requirements of contractor temporary facilities located in other portions of this contract shall apply to these lots as well.

#### 1.5 EXCAVATION AND TRENCHING

Excavation and/or trenching operations to be performed outside the (designated) limits of construction, for utility tie-ins, correction of drainage problems, or for other reasons as may be required under the terms of the contract, shall not be performed without a permit; and such work shall only be performed during normal duty hours unless otherwise approved by the Contracting Officer. Permit requests must be submitted to the Contracting Officer a minimum of 14 calendar days prior to commencement of excavation or trenching operations beyond construction limits.

#### 1.6 PROTECTION OF THE RED-COCKADED WOODPECKER (RCW)

##### 1.6.1 General

Construction activity shall be conducted in a manner which minimizes impacts to the RCW. The boundaries of RCW clusters are located as indicated in the contract drawings. Vehicle parking areas, material stockpiles, and portable toilets are prohibited within RCW clusters.

##### 1.6.2 RCW Clusters

No construction activity shall occur within an RCW cluster unless indicated in the contract drawings. When work is indicated within an RCW cluster, no tree shall be removed from the cluster without first contacting the Contracting Officer and receiving approval from the Fort Polk Environmental and Natural Resources Management Division (ENRMD). When working within an RCW cluster, no earth-disturbing activities shall occur within 15 meters (50 feet) of a cavity tree. All cavity trees are marked by a white paint band. During the nesting season of 1 April through 30 June, no construction activity shall occur within an RCW cluster until ENRMD marks the nesting trees and the Contracting Officer gives approval, after which no activity shall occur within 60 meters (200 feet) of the marked nesting trees. Activity within the 60 meters (200 feet) limit shall not resume after nesting season until ENRMD determines that the fledglings have left the nests and the Contracting Officer approves resumption of the work. At all times, construction activity within RCW clusters shall start no earlier than 30 minutes after sunrise and shall halt at a minimum of 30 minutes prior to sunset. Any construction equipment which must operate within a cluster shall be moved outside of the cluster at the end of each day.

#### 1.7 DISPOSAL OF DEMOLITION AND CONSTRUCTION DEBRIS

Unless otherwise indicated, demolition and construction debris shall be disposed of outside the limits of Government controlled land and the Contractor shall comply with all local and state regulatory requirements in his disposal operations.

Ft Polk Unit Ops Hospital COF

FPUOHCOF

## 1.8 HAZARDOUS MATERIAL CONTENT

Materials installed on this project shall conform with the Consumer Product Safety Commission's safety standards, especially materials used primarily for roofing, building and roofing insulation, joint sealants, elastomeric joint sealants and calking, gypsum board, plaster, paint and coatings (interior and exterior), fireproofing, acoustical ceiling systems, acoustical wall systems, mechanical and electrical equipment insulation or pipe wrappings. Submit certifications from material manufacturers attesting that their materials that are installed on this project, as applicable, do not contain asbestos and that the lead content does not exceed 0.06 percent (600 ppm) by (dry) weight of the material's non-volatile content.

## 1.9 ASBESTOS CERTIFICATION LETTER

Prior to the final acceptance inspection, furnish a letter certifying that no asbestos-containing materials were installed in the project. The letter format is attached at the end of this Section.

## 1.10 SOLID WASTE DISPOSITION

The Army requires that the installation track all solid waste generated (disposed and recycled) at Fort Polk (DA PAM 200-1 Section 5-9i), which includes construction and demolition debris. As a result, contractors are required to report to DPW-ENRMD the quantities of solid waste taken off the installation. The requirement to report to DPW-ENRMD is found in JRTC and Fort Polk Regulation 200-1 Section 9-4d(2) and the Contractor's Environmental Guide. Submit the report(s) to the Contracting Officer by the 5th working day of each month; the Corps will forward the report(s) to the Installation environmental office. See the Solid Waste Disposition form attached at the end of this Section.

If you have any questions or require additional information, please call the installation environmental office at 531-7542 or 6008.

## 1.11 TERMITE CONTROL

The Fort Polk Installation Pest Management Plan (IPMP) approves the use of the following two termiticides for use on Fort Polk:

Termidor 80 WG (EPA 7969-209) (BASF Corp.)  
Termidor SC (EPA 7969-210) (BASF Corp.)

## 1.12 FORT POLK CADD AND GIS DELIVERABLES

### 1.12.1 Data Standards

Spatial Data Standard for Facilities, Infrastructure and Environment (SDSFIE) current release shall be followed for Geospatial database structure and attributes to allow for data integration. CADD data shall be documented according to the current release of the Architecture, Engineering and Construction (AEC)/CADD standards. All GIS and CADD data will be documented in accordance with the Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata.

### 1.12.2 Coordinate System Projection and Datum

All GIS data shall use the Universal Transverse Mercator Zone 15 North

Ft Polk Unit Ops Hospital COF

FPUOHCOF

projection, World Geodetic System of 1984 (WGS84) datum, and the North American Vertical Datum of 1988 (NAVD88) using Metric as the working units to ensure data alignment and accuracy.

CADD data shall be geo-referenced in the State Plane Coordinate System 1983, using the North American 1983 Geodetic Datum with Survey Feet as the working units. The projection, datum and coordinate system must be defined and then documented in the metadata for both CADD and GIS and provided whenever the data is distributed.

#### 1.12.3 CADD & GIS Deliverables

All CADD deliverables of As-built drawings shall be delivered in a MicroStation V8 .DGN compatible format utilizing survey feet for the working units. A seed file can be obtained from the Fort Polk DPW CADD/GIS Center. GIS deliverables shall be delivered in current GeoMedia file format or an ArcView shape file format.

#### 1.12.4 Point Of Contact

Contact: Fort Polk DPW CADD/GIS Center 337-531-6846

#### 1.13 WATER AND WASTE WATER (Feb 2011)

##### **Standard Operating Procedure For Projects requiring Water or Waste Water Services**

#### 1.13.1 Purpose:

To outline requirements of Construction Projects connecting to American Water's water and waste water systems.

#### 1.13.2 Regulatory and Contractual Requirements:

American Water Operations and Maintenance, Inc. (AW) is the owner and operator of the water and wastewater systems. Defense Energy Support Center (DESC) privatization contract (SP0600-08-C-8257) makes American Water responsible for evaluating the impacts of projects on the water and wastewater systems, designing system upgrades, and performing the upgrades necessary to provide dependable water and wastewater services at a reasonable cost. The contract makes AW responsible for "performing the necessary work on all necessary additions or modifications up to the established points of demarcation for new construction".

Louisiana Sanitary Code Title 51 Subpart XII paragraph 105 requires the owner of the water system to obtain LDHH approval prior to the start of construction for modifications to the water system that affect the capacity, hydraulic conditions, functioning of treatment processes or quality of finished water. All projects using water/wastewater services will require AW and LDHH approval. Louisiana Sanitary Code requires this approval to be obtained prior to start of construction.

#### 1.13.3 LDHH project approval process:

a) The Project Manager shall determine the water and waste water requirements of the project and involve American Water in the project upon project conception.

1) Maximum water flow

Ft Polk Unit Ops Hospital COF

FPUOHCOF

- 2) Minimum pressure
  - 3) Average daily water usage
  - 4) Sitemap indicating "Point of Demarcation" GPS location of "Point of Demarcation" for both water and wastewater connections including elevations. Note: The wastewater elevation must be coordinated with American Water to ensure proper flow.
  - 5) Target start of construction date.
  - 6) Date service connections are required, 180 days prior to connection when possible. Note: Any change to the flow or pressure requirements will require new AW and LDHH approval. Changes could also impact timing and costs.
- b) The Project Manager shall supply American Water Contract Contracting Officer Representative (COR) the information on the project's water and waste water requirements. (See AW Contract, Request for Action)
- c) American Water will evaluate the projects water and waste water loading on the water and waste water systems and determine system upgrades necessary for the project.
- d) American Water will submit the system upgrade requirements to the COR (see AW Contract, Request for Action).
- e) The project manager will request firm costs prices for the system upgrades. All requests for proposals (RFP) will come from DESC to AW via Fort Polk COR. (FFP requires minimum 60 days, depending on size of project)
- f) The Project Manager will award the systems upgrades to the appropriate party.
- g) The party performing the system upgrades will submit the completed design drawings to American Water for review. The design drawings must be 100 percent drawings signed and stamped by a Licensed Louisiana P.E. These drawings must be submitted 8 weeks (2 week AW review and 6 week LDHH turn around) prior to the start of construction to allow for LDHH approval.
- h) American Water will manage the process (see AW Contract, Fort Polk Design Guide) of obtaining LDHH approval and inform the COR in writing that construction can start.
- i) Fire Flow requirements for any proposed structure (flow rate, duration, and pressure at point of delivery).
- j) All future expansion expected or otherwise anticipated by the project (this must be addressed as phased construction or not assumed).

Note 1: The project manager is responsible for identifying all water and sewer requirements. The following information must be provided to American Water early enough for American Water to determine system upgrades required in step "c" above.

The following additional information should be provided if available:

- o Hydraulic Model results

Ft Polk Unit Ops Hospital COF

FPUOHCOF

## 1.13.4 DPW Points of Contact:

Close coordination must be maintained with applicable organizations of the W-3 working group. Organizational points of contact are listed below:

DES-Fire Department	531-2026
DES-Physical Security	531-4913
DPW-Engineering	531-6186
DPW-ENRMD 531-6008 DPW-OMD	531-2421
DPW-Planning	531-6103
Preventive Medicine-EH	531-4846
American Water	537-1161

1.13.5 **This SOP will remain in effect until suspended or rescinded.**

R. ELLIS SMITH

Director of Public Works

## 1.13.6 American Water (AW)'s Design Specifications

American Water's design specifications are located at the following Internet link:

<http://www.amwater.com/products-and-services/federal-services/military-services/design-s>

## 1.14 DOOR HARDWARE (Sep 2010)

Unless otherwise required by project requirements, hardware shall conform to the current ANSI/BHMA standards, grade 1. Locks, cylinders, and cores shall comply with ANSI/BHMA A156.13, Mortise Locks & Latches Series 1000, ANSI/BHMA A156.2 Bored and Preassembled Locks and Latches, and ANSI/BHMA A156.3 Exit Devices. Cylinders shall have key removable type cores. Cores shall have not less than seven pins. Extensions of the existing keying systems shall be provided. Cylinders and cores for locksets other than those for mechanical rooms shall be manufactured by Best Lock Corporation to extend the existing Base Keying System. Locksets for mechanical rooms only shall be keyed to the existing Post utilities master keying system, consisting of locksets manufactured by Arrow Lock Co., Keyway K-7; furnish keys "O" bitted. Disassembly of knob or lockset shall not be required to remove core from lockset. All locksets, exit devices, and padlocks shall accept same interchangeable cores.

a. Cores and cylinders shall fit locksets without the use of adaptors and without play. The key shall easily lock and unlock the lockset without binding or other difficulties. Control key shall easily remove and install cores.

b. Locks shall be keyed in sets or subsets in accordance with the approved schedule. Furnish locks with the manufacturer's standard construction cores and key system. Send permanent cylinders, cores, keys, and the lock set-up code to the Contracting Officer by registered mail or



Ft Polk Unit Ops Hospital COF

FPUOHCOF

other approved means.

c. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys.

d. All keys shall be marked with "U.S. GOVERNMENT - DO NOT DUPLICATE". Do not place room number on keys other than control/core keys. Stamp all control/core keys with building code and building number, and the letter "C".

e. All keys shall be stamped with 1/16" to 1/8" high characters.

f. Furnish keys to the Contracting Officer arranged in a container suitable for key control system storage in sets or subsets as scheduled.

g. Closers: BHMA A156.4, Surface type closers shall be Grade 1, Series C02000 Full Cover with options PT-4H, Size 1 or 2 through Size 6, and PT-4D with back check position valve. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting, pivots, cement cases, and other features necessary for the particular application. Provide manufacturer's 10 year warranty.

(1) Closers for outswinging exterior doors shall have parallel arms or shall be top jamb mounted. Provide narrow projection closers for doors close to a wall so as not to strike the wall at the 90-degree open position.

(2) Closers on doors accessible to the physically handicapped shall have the closing force set for a push-pull of 2.27 kg (5 pounds) applied at the knob or handle for interior doors; for exterior doors, set to the minimum required to relatch the door.

## PART 2 PRODUCTS (NOT APPLICABLE)

## PART 3 EXECUTION

### 3.1 FORMS

#### 3.1.1 Asbestos Certification Letter

#### CERTIFICATION LETTER

Project Name: \_\_\_\_\_

Name of Contractor: \_\_\_\_\_

Project Contract/Delivery Order Number: \_\_\_\_\_

Facility Number: \_\_\_\_\_

Date: \_\_\_\_\_

To Whom It May Concern:

This letter is to certify that the project indicated above has been constructed using no asbestos-containing materials in accordance with the

Ft Polk Unit Ops Hospital COF

FPUOHCOF

design requirements.

Sincerely,

Typed Name: \_\_\_\_\_

Written / Typed Name: \_\_\_\_\_

Ft Polk Unit Ops Hospital COF

FPUOHCOF

## 3.1.2 SOLID WASTE DISPOSITION (Mar 2011)

**Contractor Name, address, phone number, contract number:**

Contractor Name, address, phone number, contract number	Date	Name of Contractor	Name of Disposal Facility / POC	Disposal or Recycle Transaction	Cubic Yards
<b>Concrete</b> (Cubic Yds) per haul					
<b>Asphalt</b> (Cubic Yds ) per haul					
<b>Routine Mixed Debris</b> (Cubic Yds per					
<b>Asbestos Abatement</b> ( lbs per ticket)					
<b>Universal Waste</b> ( lbs per ticket)					
<b>Land Clearing Debris, Stumps</b> (Cubic Yds per haul)					
<b>Concrete:</b> Goes to crushing yard off of Texas Ave					
<b>Asphalt:</b> Call COE Office for Info					
<b>Routine Mixed Debris:</b> Contractor option to permitted facility					

Ft Polk Unit Ops Hospital COF

FPUOHCOF

Contractor Name, address, phone number, contract number	Date	Name of Contractor	Name of Disposal Facility / POC	Disposal or Recycle Transaction	Cubic Yards
<b>Asbestos Abatement:</b> Permitted facility of choice					
<b>Universal Waste:</b> Contractor option at permitted facility					
<b>Land Clearing Debris, IE stumps etc:</b> Should be taken to chipping operation for recycle credit if available					

-- End of Section --